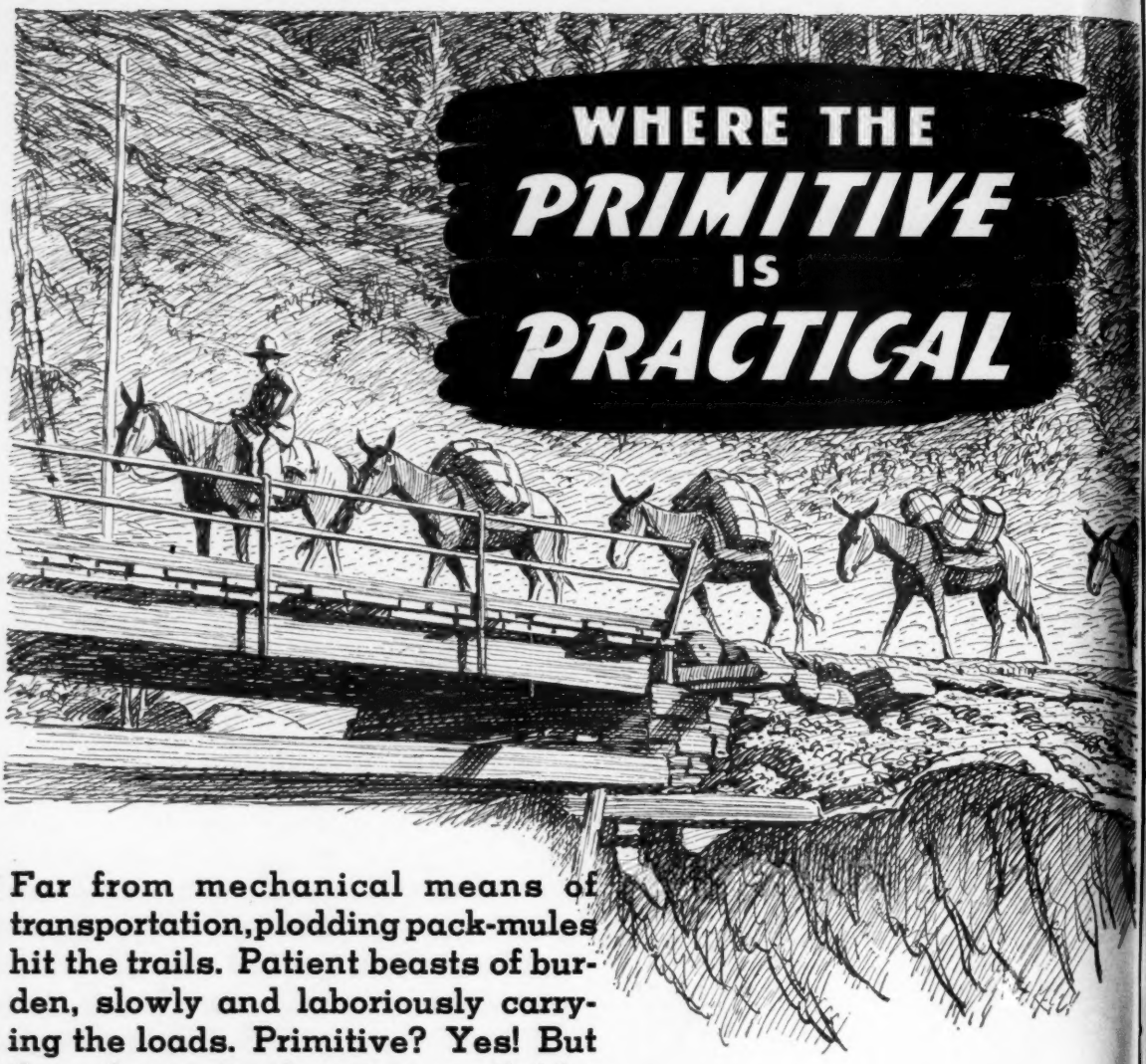
Flow

MAR 11 1946

THE MAGAZINE WHICH INTEGRATES MATERIAL HANDLING EQUIPMENT INTO THE FLOW OF PRODUCTI

IN THIS ISSUE: The Die Is Cast ... "Crystal" Clear Handling ... A "Shelf-Made" Solution
Elsie Gets a Lift ... For a Perfect Score ...



Far from mechanical means of transportation, plodding pack-mules hit the trails. Patient beasts of burden, slowly and laboriously carrying the loads. Primitive? Yes! But the only practical system available.

$675.00
F.O.B. Jackson Mich.

There's no excuse for pack-mule procedure around your place of business. The Truck-Man is the modern beast of burden to carry the loads along your factory trails—loads as high as 2000 pounds.

The Truck-Man is a thing of steel. Untiring, obedient, trustworthy. But surefooted and nimble to negotiate the narrow spaces and winding aisles.

Equipped with gasoline power—hydraulic lift—two speeds. Mechanical transportation that lightens labor, saves man hours, pares production costs. Simple to operate. Built for years of service.

Write for descriptive literature.

truck-man

a product of
YARD-MAN INC.
1418 West Ganson, Jackson, Mich.

"I FOUND a way to save $24,480.00 in my Wastebasket"

"Something caught my eye in the wastebasket . . . a trade journal I had flipped through and discarded. It was turned up to an ad which promised a 46% saving in material handling costs. When they talked about cutting my handling costs that much, well, I wanted to be shown.

"Literature told how this saving could be accomplished simply through the use of a bright, shiny orange and black electric truck called 'Transporter' . . . the miracle truck that lightens life's loads. It was an impressive story. As a result I ordered one, and an A.T.C. Specialist showed up with it to demonstrate what they claimed.

"He piled 6000 pounds of our most unwieldy product on it. Then asked for one of our stenographers . . . and she promptly walked off with the load as easy as she'd powder her nose. Her thumb pressed a button, her hand gently guided it. That's all there was to it. Husky truckers accustomed to a three-man operation moving similar loads were amazed . . . couldn't wait to try this wonder truck that meant for them an end to back-breaking, gruelling toil.

"I was more than sold on Automatic Transporters. They have cut our material handling costs 46% . . . a solid $24,480.00 saved*—the equivalent of $244,800.00 worth of increased volume on a 10% profit basis. That's the money-saving, profit-making opportunity I found in my wastebasket."

Such savings may be duplicated many times over during the life of Transporters . . . may be multiplied many times depending on the size of your material handling operation. Mail the coupon for complete facts.

Remember: Only AUTOMATIC Makes the TRANSPORTER

Transporter
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

**Case 10 in "Automatic Savings Parade"*

AUTOMATIC TRANSPORTATION COMPANY
Div. of The Yale & Towne Mfg. Co.
141 West 87th Street, Dept. C, Chicago 20, Ill.

Please mail me, without cost or obligation, complete facts about AUTOMATIC TRANSPORTER, the miracle electric truck . . . plus *proof* that it has cut handling costs in half.

☐ Have an A.T.C. Material Handling Specialist call.

Company Name.....

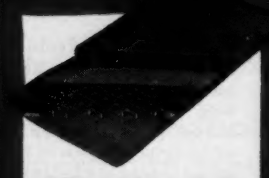
By.....*Position*.....

Street Address.....

City.....*State*.....

HOW EFFICIENT IS YOUR

Battery Power?



KATHANODE UNIT

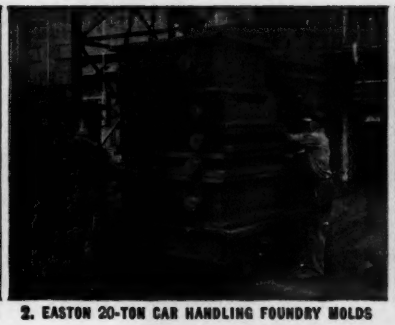
The positive plate assembly of Gould Kathanode includes grid, Black Oxide active material, spun-glass mats and Unit-Seal envelop. Separators are of Durapor porous rubber.

Gould Kathanode power is sustained power. It assures speedy and economical electric truck operation even during the latter stages of Kathanode's long service life.

The main reason for the sustained power of Gould Kathanode is the unusual protection of the power-producing positive plates. They have spun-glass mats in contact with each face, which are held in place by the specially designed Unit-Seal envelop. Solid at the edges and with open ends this envelop allows spent active material to filter out. It cannot lodge or tree. Internal short circuits, a common cause of power losses, are minimized in Kathanode.

Keep your electric trucks running with Kathanode. Write Dept. 103 for Catalog 100 on Gould Kathanode Glassklad Batteries for Industrial Truck and Tractor Service.

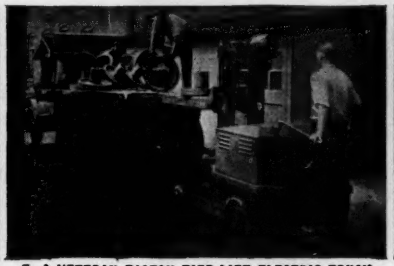
1. EASTON TIER-LIFT ELECTRIC PLATFORM TRUCK



2. EASTON 20-TON CAR HANDLING FOUNDRY MOLDS

3. EASTON SPECIAL LARGE CAPACITY CORE-OVEN CAR

4. EASTON 2-TON RUBBER-TIRED PLATFORM TRAILER



5. A VETERAN EASTON TIER-LIFT ELECTRIC TRUCK

6. EASTON RUBBER-TIRED STOCKROOM TRAILER

7. EASTON PLATFORM TRAILER WITH STEEL WHEELS

8. EASTON LOW-LIFT TRUCK PUSHING PLATFORM CAR

9. TWO EASTON 40-TON DOUBLE-TRUCK PLATFORM CARS

10. EASTON LOW-LIFT ELECTRIC PLATFORM TRUCK

11. EASTON 5-TON PLATFORM CAR, TIMKEN BEARINGS

12. EASTON OPEN FRAME TRAILER, 5000 LBS. CAPACITY

AN INTEGRATED ENGINEERING SERVICE TO MEET YOUR HANDLING PROBLEMS...

ALL of these EASTON-engineered electric lift trucks, industrial cars and trailers are serving *one* manufacturing plant. The complexity of light and heavy, routine and highly specialized handling and production operations helps to illustrate the scope of EASTON's integrated engineering service. Plant managers and engineers who are faced with a similar variety of flow and handling problems find it convenient and helpful to refer their questions to

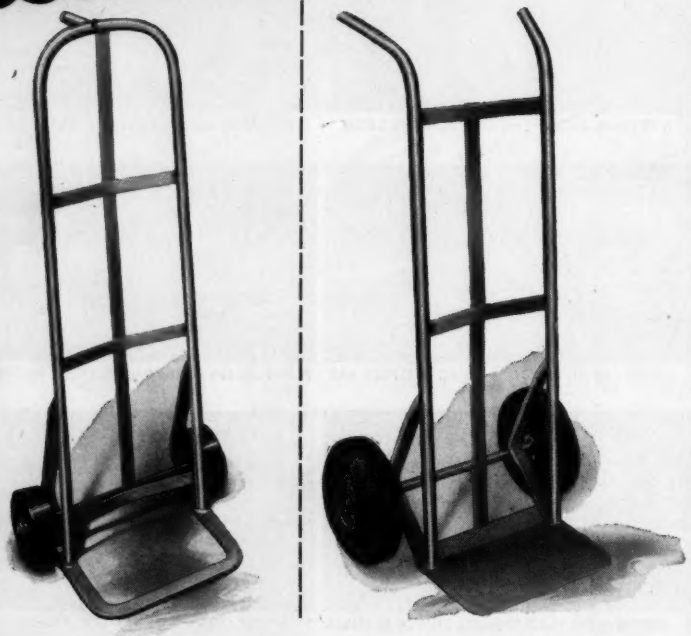
Engineering Counsel, Easton Car & Construction Co., Easton, Pa.

EASTON
TRAILERS · TRUCK BODIES
CARS · ELECTRIC TRUCKS
ENGINEERED

A-1009

CASES, KEGS AND PACKAGES *can't walk*

but it's easy wheeling with a WHEEL-EZY



Cases, kegs and packages can't walk and you're wasting time, labor and money if you lug them about by hand. A Rapids-Standard *Wheel-Ezy* hand truck will give you *easy wheeling* with these bulky objects and will keep your handling costs low. Bottlers, brewers, distributors, super-markets and delivery men are finding increasing use for the Wheel-Ezy. There is a use for at least one in every plant. Strong, lightweight and perfectly balanced, Wheel-Ezy handles loads up to 500 pounds with ease. "Step-Climber" feature makes it possible to go up and down steps in easy fashion. Now available in one and two handled models, open or solid plate nose. Write for literature and price lists — no obligation.

CHOICE OF WHEELS

AGH—Demountable Cushion rubber wheels . . . it's *tough*. MOCH—Moulded on Cushion Rubber Wheels, moulded to metal core. ABK—Plastic wheel with laminated fabric tread, moulded under heat and pressure. MRK—Resinoid Wheels made of sturdy canvas duck, macerated and moulded under heat and pressure. Plain or Roller Bearings. NICRO STEEL—Fine quality grain castings, fully machined. Oilite Bearings, zerk lubrication. GP—General Pneumatic with 10" x 3.50" demountable rubber tires.

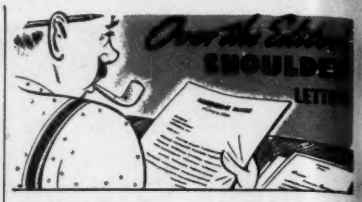
OFFICES IN PRINCIPAL CITIES

Manufacturers of

STEEL FORGED CASTERS - TRUCKS - CONVEYORS - POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division—377 Peoples National Bank Bldg., Grand Rapids 2, Michigan



To FLOW:

Going to Australia

While in the U. S. on a visit from Australia, I have had an opportunity of looking through a copy of the October issue of FLOW, and am now arranging for my principals to become one of your subscribers.

I am unwilling to mutilate the office copy of General Motors Overseas Operations by cutting out the coupon on page sixty-one, and would appreciate receiving copies of the literature enumerated below. —T. Steward, Plant & Equipment Engineer, Australian Operations, General Motors Overseas Operations, Detroit, Mich.

A separate card, soon to be inserted in the magazine for Free Literature requests, will before long overcome Reader Stewart's objection, which has also been expressed by other readers.—Ed.

To FLOW:

Meets the Need

I have entered a subscription for FLOW. It is a magazine we have been waiting for.—R. A. Stass, Material Handling Engineer, Electric Storage Battery Co., Philadelphia, Pa.

To FLOW:

Re: Small Printing Plant

I have just finished reading your very interesting December issue.

Have you at any time covered a small printing plant? I would be interested in seeing any copies of your fine publication dealing with this problem.—Wm. F. Haddon, Denver, Col.

While the January article, "Extra, Extra! Read All About It," includes the feeding of newsprint to presses, a small printing plant as such has not yet been covered. FLOW'S roving editors have a story working now on a newsworthy plant of this type.—Ed.

To FLOW:

Wants FLOW, And Information

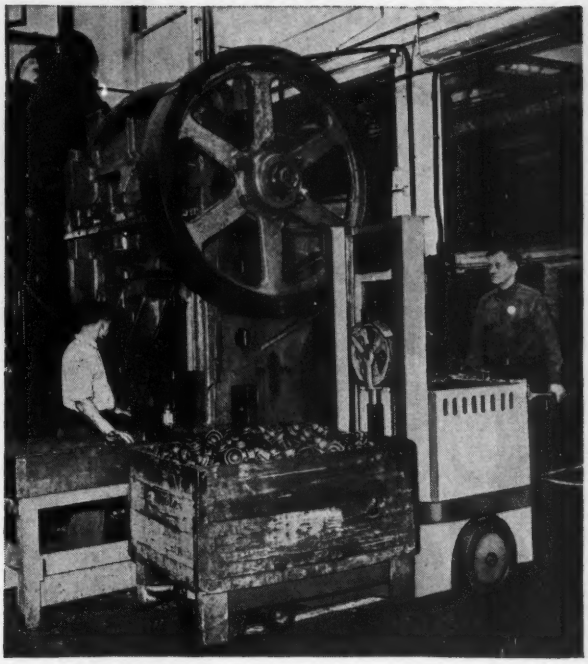
Will you kindly enter our

(Turn to page 38)

USE BATTERY TRUCKS

for most efficient

STOP-and-GO handling



In Industrial Trucks, Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They can be **charged rapidly;** gassing cannot dislodge the active materials.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents.
- They can **stand idle indefinitely** without injury. Merely discharge, short-circuit, and store in a clean, dry place.
- They are **simple and easy to maintain.**

Edison
ALKALINE BATTERIES

. . . ALKALINE BATTERIES

for most economical power

In moving materials to and from a production machine, an industrial truck will usually make 14 or more moves forward, backward, up and down. A battery-powered industrial truck has natural advantages in this and other stop-and-go handling services because of its superior maneuverability, high availability and extremely dependable operation. It gets the necessary surges of power instantly from its battery, yet consumes no power during stops. Thus it not only uses power with high efficiency but the current used for charging its batteries is the lowest-cost power available.

Its electric-motor drives for traction and lifting, operate quietly, without vibration, and with almost negligible repair requirements. With batteries exchanged two or three times per 24-hour day, the truck is continuously supplied with power. So except for the few minutes needed to exchange batteries, the truck need not stop work for servicing of its power unit.

For stop-and-go material-handling work, therefore, a battery industrial truck is an inherently dependable and economical machine . . . especially when powered by Edison Alkaline batteries. With steel cell construction, a solution that is a natural preservative of steel, and a fool-proof electrochemical principle of operation, they are the longest-lived, most durable, and most trouble-free of all batteries. Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey. In Canada: International Equipment Company, Limited, Montreal and Toronto.

TO CUT COSTS

in Materials Handling

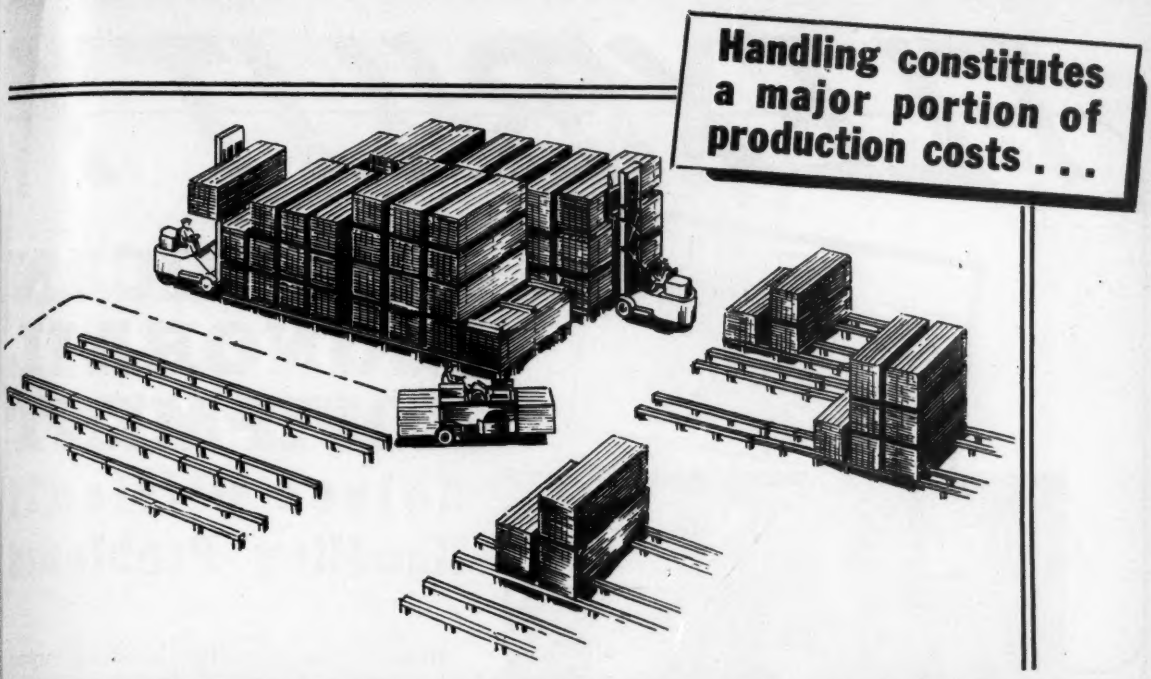
RECONVERTING to peacetime production? . . . Outfitting a new plant? . . . Want to save time, cut costs and increase profits? . . .

Streamline your materials handling with Union Metal all-steel SKIDS, BOXES, PALLETS.

Light weight, easy to handle, long-lasting. Standard models to fit all normal requirements. Special designs developed on order. For complete details, write The Union Metal Manufacturing Co., Canton 5, Ohio.

UNION METAL

Materials Handling Equipment



ARE YOUR COSTS AS LOW AS THEY SHOULD BE?

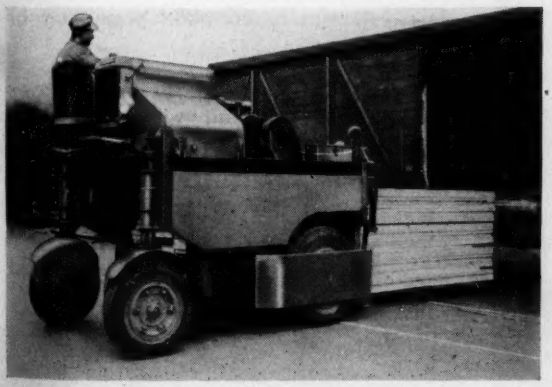
Check up now on your materials-handling methods and equipment!

Remember, because *handling* IS one of the most important phases of production, it can well determine your margin-of-profit. So check NOW and find out whether your handling set-up is "delivering the goods" at lowest possible cost. Then investigate the proven ability of The ROSS System of Straddle Carriers and Lift Trucks to move more materials *faster*, at lower cost . . . .

Look to ROSS for help in Solving your handling problems

More than thirty years' experience has enabled ROSS to suggest *practical* solutions to the materials-handling problems of hundreds of mills and yards. *Your* problem will receive the careful consideration of ROSS engineers and representatives. Why not get in touch with those nearest you today?

Write for your free copy of ROSS BULLETIN F-36



Ross Series 70 Straddle Carrier

Ross Heavy Duty Lift Truck

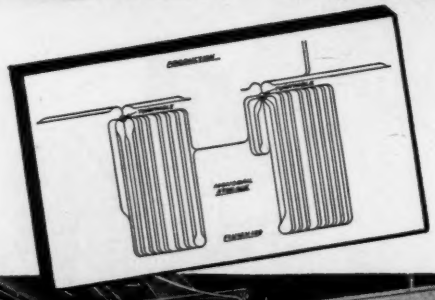
ROSS CARRIER COMPANY

FACTORY — BENTON HARBOR, MICH.

BRANCHES: SEATTLE PORTLAND SAN FRANCISCO VANCOUVER, B. C. MEMPHIS NEW YORK CITY HOBOKEN, N. J.

FLEXIBILITY

of AMERICAN MONORAIL EQUIPMENT Solves Difficult Handling Problems

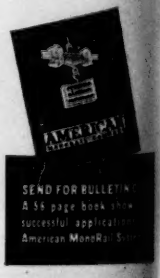


Here is another of the hundreds upon hundreds of handling problems efficiently and economically solved by American MonoRail Overhead Handling Equipment.

THE PROBLEM: To eliminate manual handling of reels from production machines to storage, from storage to finishing, from finishing to storage or shipping as required.

THE ANSWER: The FLEXIBILITY of American MonoRail switching arrangements permits reels to move on carriers with no rehandling between processes. Ample live storage is allowed, permitting free movement between all processes.

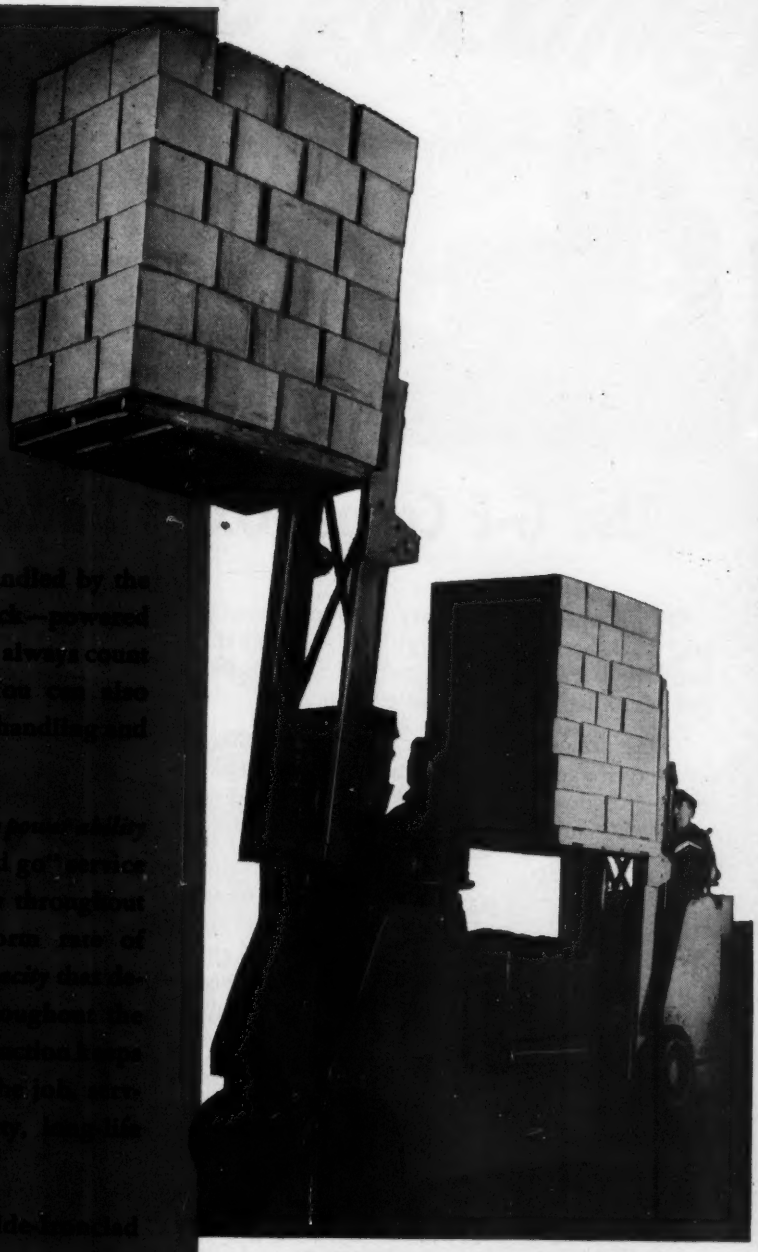
What is your handling problem? American MonoRail Engineers come up with the answer to efficient and economical handling ninety-nine times out of a hundred. We invite your inquiries.



THE AMERICAN MONORAIL COMPANY

13129 ATHENS AVE. • CLEVELAND 7, OHIO

EXIDE-IRONCLAD POWER MEANS *ALL-DAY-LONG* POWER



When your materials are handled by the efficient electric industrial truck—powered by Exide-Ironclads—you can always count on full shift availability. You can also count on faster, safer, easier handling and at a lower cost.

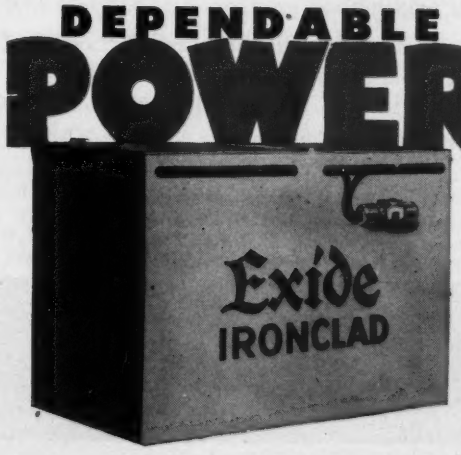
Exide-Ironclads have the *high peak ability* needed for frequent "stop and go" service . . . a *high* maximized voltage throughout discharge, insuring a uniform rate of operations . . . and a *high* capacity that delivers peak performance throughout the shift. And their rugged construction keeps Exide-Ironclads steadily on the job, giving you with dependability, safety, long life and ease of maintenance.

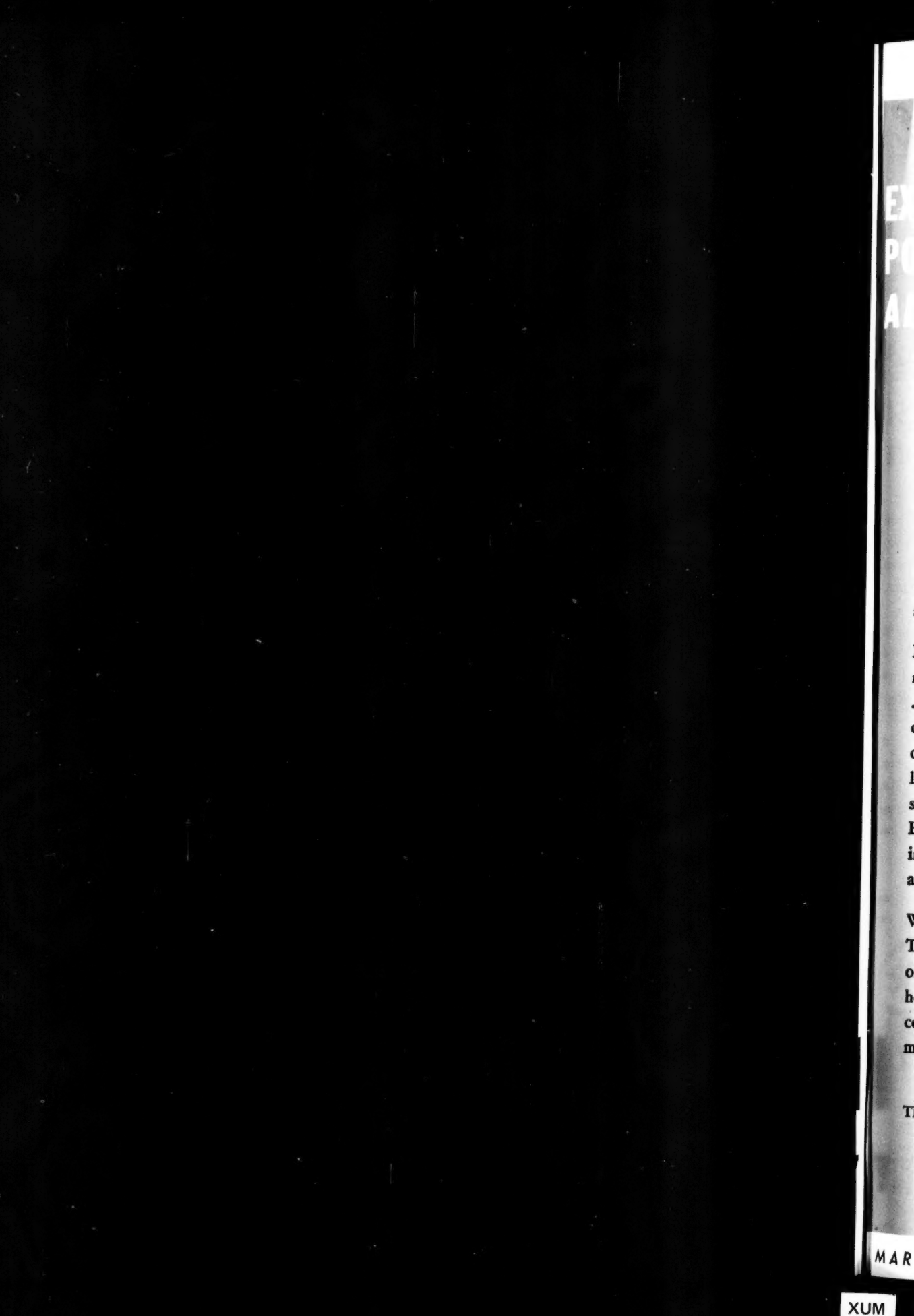
Write us for a FREE copy of Exide-Ironclad TOPICS which contains "Case Studies" of materials handling problems. Tells how to cut handling costs up to 50%. . . . gives latest developments in handling methods from receiving to shipping.

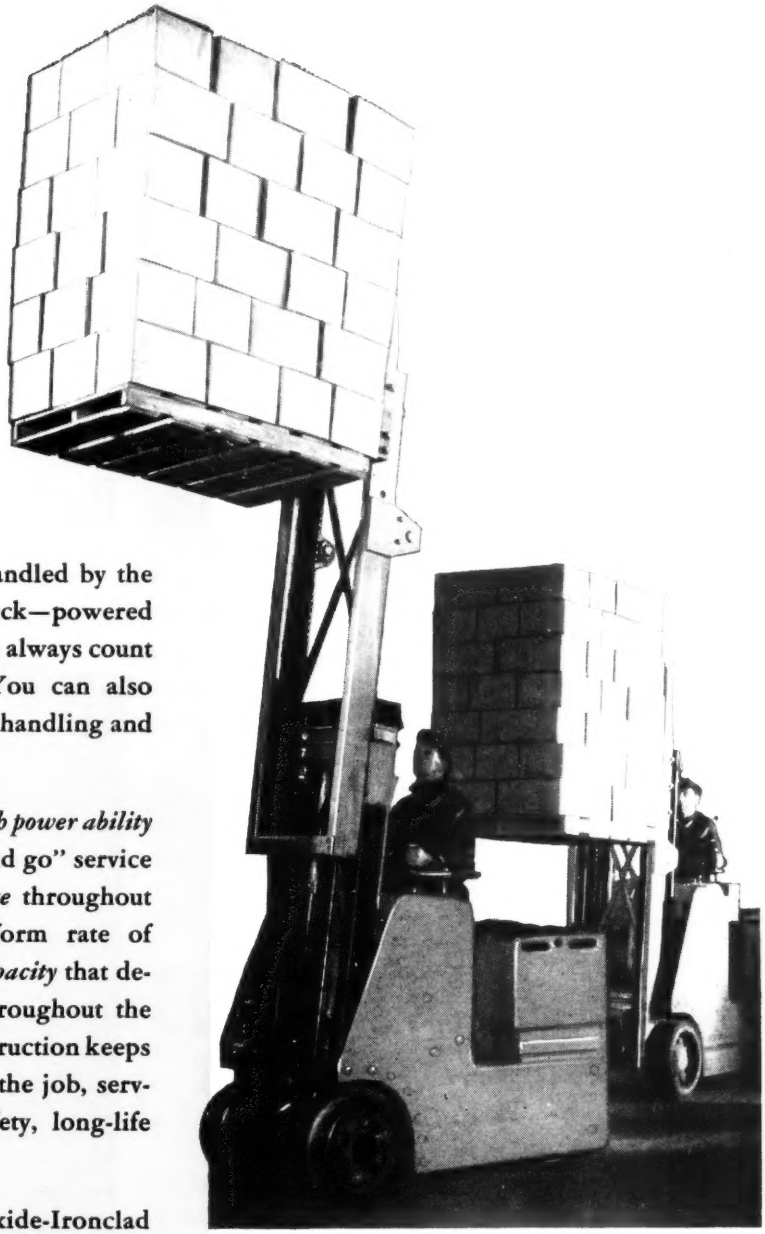
THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

DEPENDABLE
POWER







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THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

DEPENDABLE

Get More Work For Less Cost

Use G-E Copper-Oxide Battery Chargers

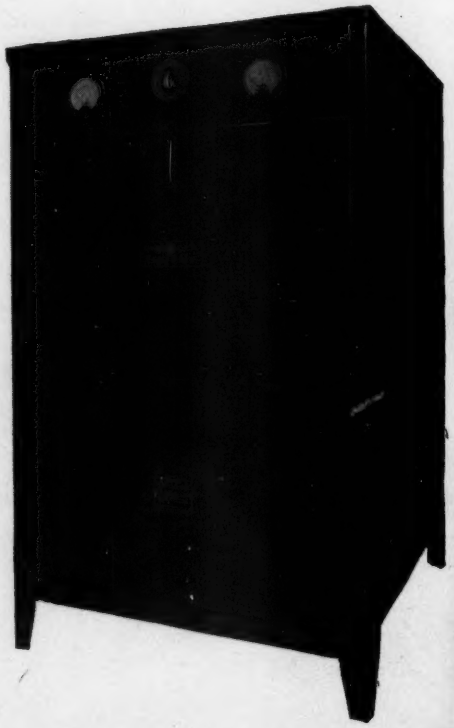
G-E Copper-oxide Battery Chargers for electric truck batteries rate high in industries that know and watch operating costs. They're flexible, automatic, rugged and efficient.

There are models to meet the exacting charging requirements of batteries used in all makes of large industrial trucks, as well as the requirements of smaller batteries used in motorized hand trucks.

These low-cost chargers are easy and economical to operate. They keep trucks properly batteried, and contribute greatly to increased production by helping to move materials between processes without congestion or delay. They're designed for "On-the-spot" charging, which saves time and labor by ending the need for shipping trucks to central charging stations after long hauls or a hard day's work.

In G-E Copper-oxide Chargers, the only moving part is the fan, hence maintenance, compared with other types of battery charging equipment, is negligible.

For complete details, write Section A-1158-98, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

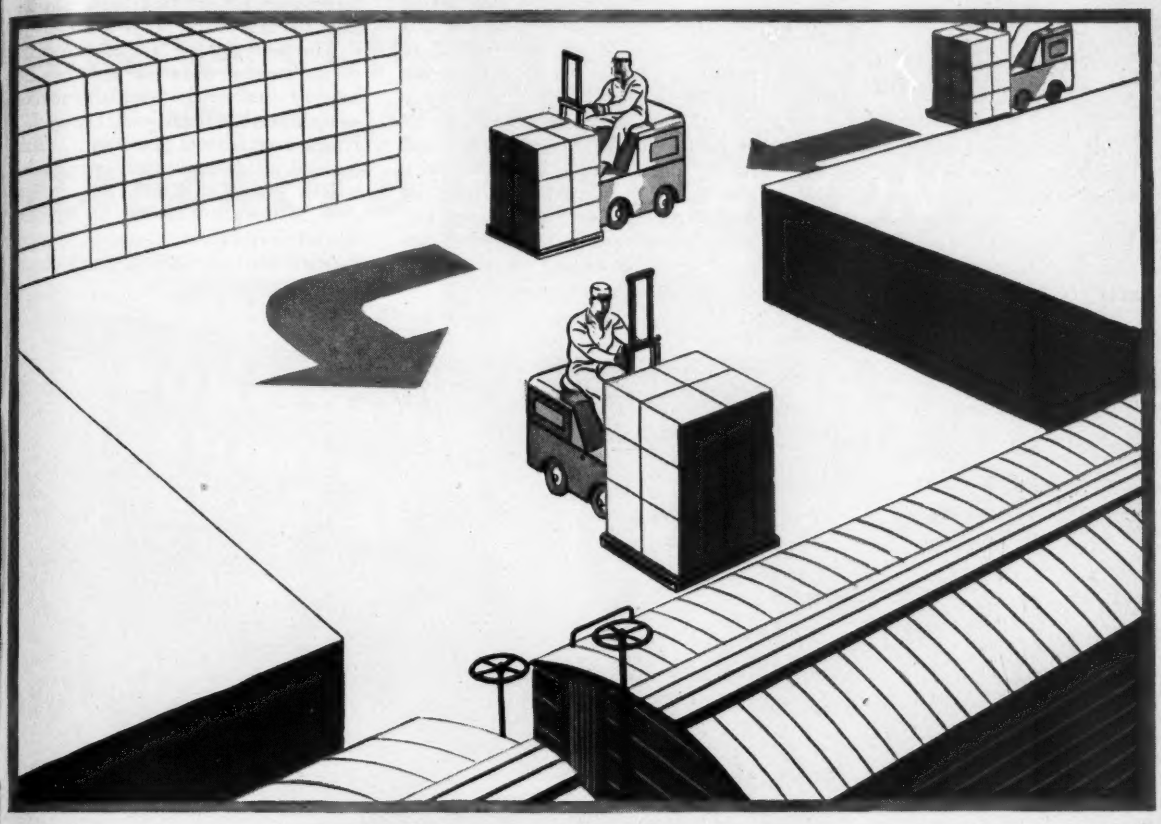


This is a combination charger capable of charging lead-acid or nickel-alkaline batteries. Completely automatic, it gives an initial high charging rate which reduces to a safe finishing rate cutting off automatically on termination of charge.

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EST, NBC. "The World Today" news every weekday 6:45 P.M. EST, CBS. "The G-E House Party" Monday through Friday 4:00 P.M. EST, CBS.

GENERAL ELECTRIC

FOR EASIER ROLLING!



U. S. NEOPRENE INDUSTRIAL SOLID TIRES

SPECIFY U.S. Neoprene INDUSTRIAL SOLID TIRES

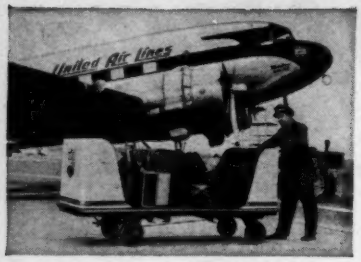
U. S. Neoprene Industrial Solid Tires roll easier —reduce power consumption—haul more loads per day at less cost per load—step up operating efficiency as much as 60%. Call your U. S. Tire Distributor today!

LOWER ROLLING RESISTANCE = LOWER POWER CONSUMPTION = REDUCED OPERATING COST

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

1230 AVENUE OF THE AMERICAS · ROCKEFELLER CENTER · NEW YORK 20, N. Y.



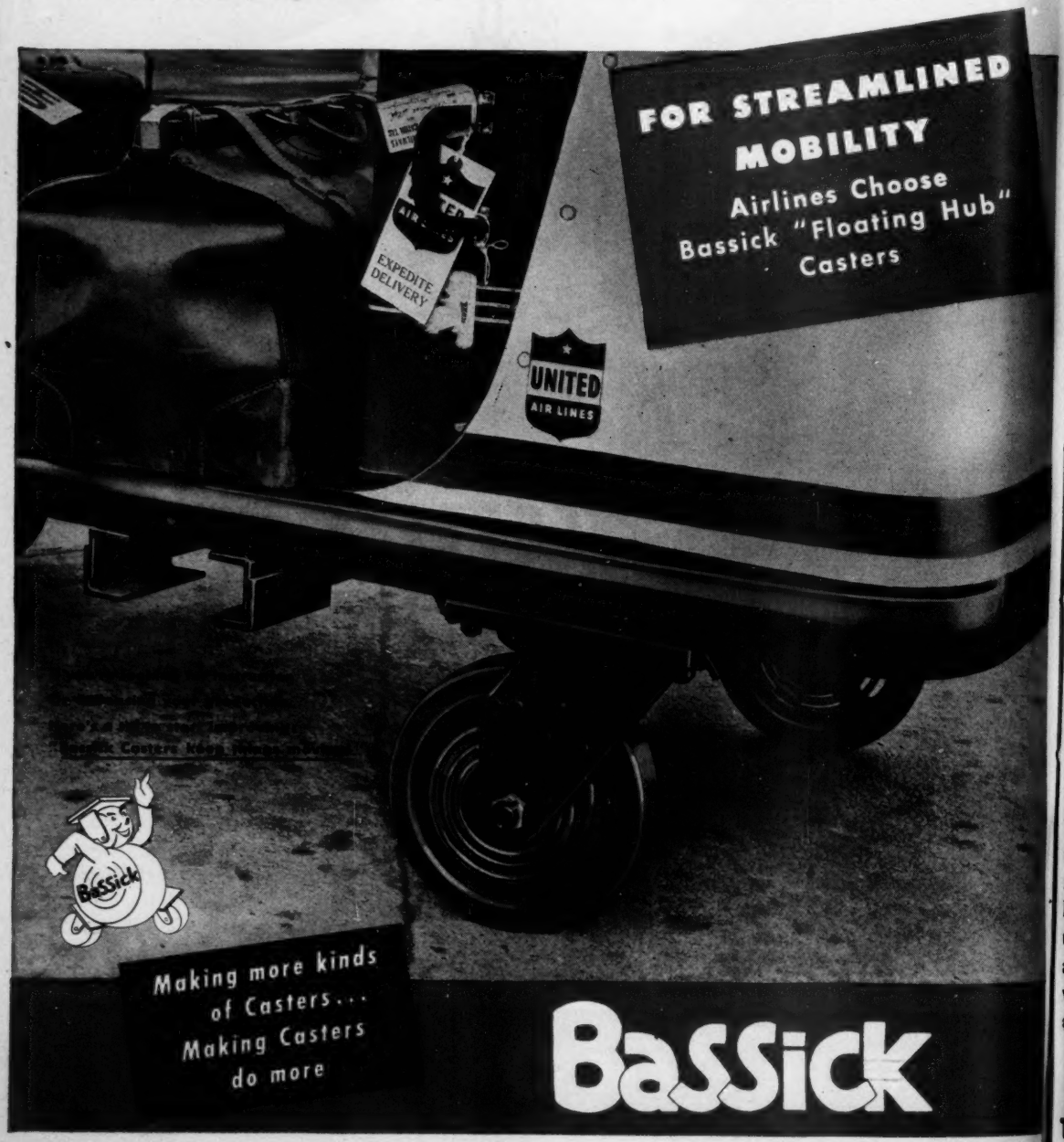
Specialists in fast, smooth transportation, airline officials are quick to see the advantages of Bassick "Floating Hub" Casters and Wheels. That's why United Airlines selected these radically different wheel mountings on airfield service trucks — to eliminate the jolting over uneven ground that might damage material carried, and to give these fast-moving trucks longer life, with smoother, easier operation.

The new "Floating Hub" construction is a notable achievement — a practical solution to a long-sought method of providing springing action between the rim and the axle of a wheel. It literally *floats* the load between rim and axle by building shock absorption in the wheel itself. Besides being effective shock absorbers, "Floating Hubs" keep all wheels on the ground, dampen vibration, reduce noise — give to hitherto unsprung loads the smooth riding qualities of an automobile.

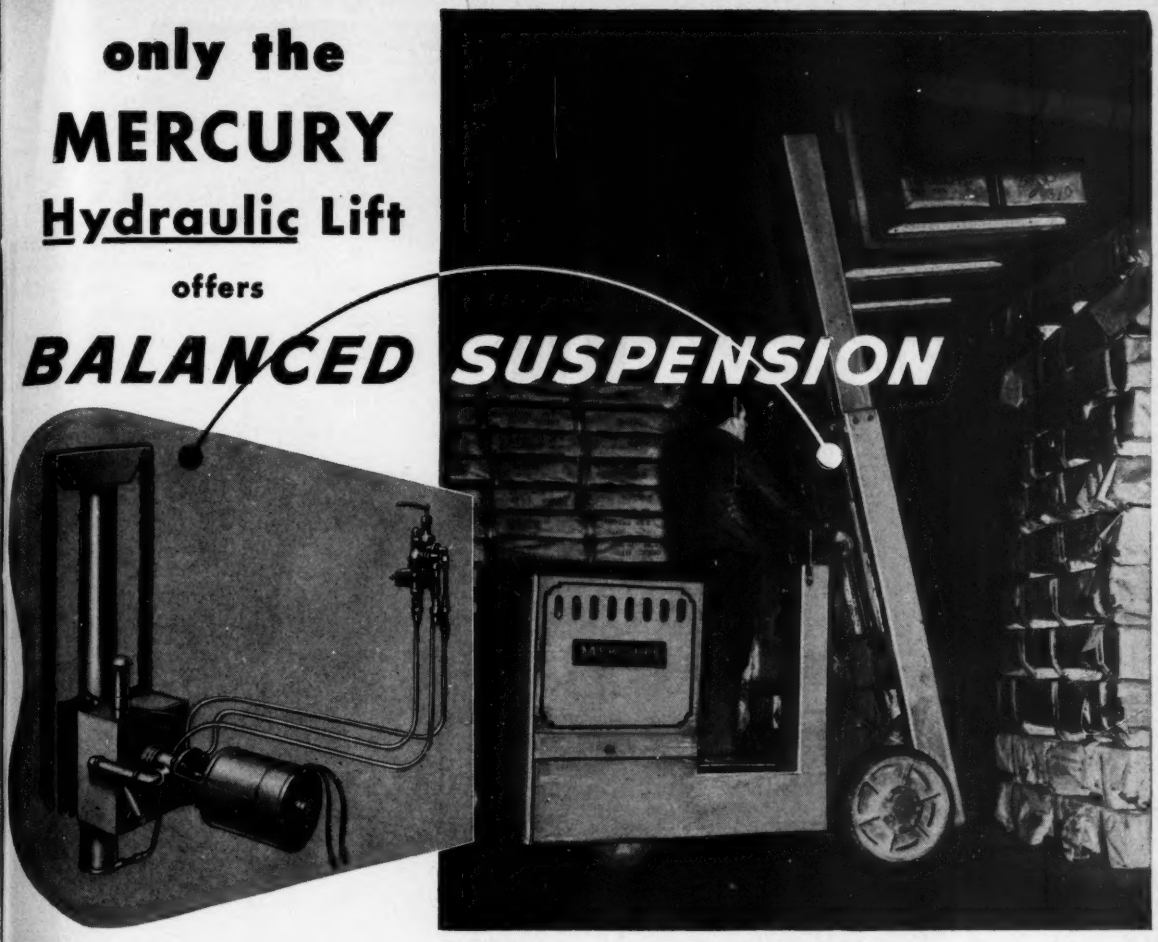
"Floating Hub" Wheels are now being used in hundreds of different applications. Bassick Casters and Wheel Mountings with "Floating Hubs" are available in many sizes for carrying loads ranging from 100 to 2000 lbs. per wheel.

Whenever you need wheels to make things move — from tea tables to the heaviest industrial materials-handling equipment—look to Bassick, the world's largest manufacturer of casters . . . Sold by leading industrial supply distributors.

THE BASSICK COMPANY, Bridgeport 2, Conn. Division of Stewart-Warner Corporation. *Canadian Division:* Stewart-Warner-Alemite Corporation, Ltd., Belleville, Ont.



only the MERCURY Hydraulic Lift offers BALANCED SUSPENSION



Mercury engineers were the first to apply successfully the hydraulic principle to the lift mechanism of industrial trucks. The Mercury hydraulic lift offers these advantages:

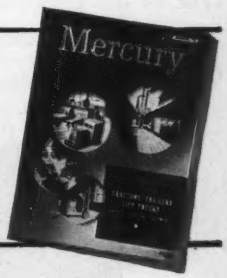
1. **Balanced Load Suspension:** *Patented* cross suspension of fork carriage eliminates unequal strains created by off-center pick up of loads.
2. **Simple Design:** Requires less than 50% of the usual number of moving parts.
3. **Economy:** No power required to lower load—no power wasted in lifting.
4. **Safety:** Relief valve provides complete overload protection at all times.

The soundness of the hydraulic lift principle, and the important advantages it offers, are today widely recognized throughout industry. The Mercury lift, however, in addition to providing the usual advantages of the hydraulic system, offers the exclusive and patented "Balanced Load Suspension" feature, which prevents side loading of the ram even with an off-center load.

Other outstanding features of Mercury trucks are: Single-unit drive assembly . . . Snap action, cam-operated controller . . . All welded frame construction. These are but a few of the many reasons why Mercury Industrial Trucks enjoy wide preference in industry.

FREE: BULLETIN 7-11
(Revised and Expanded Edition)

Fifty-six pages of valuable information to help you reduce operating costs through improved materials handling. Contains complete specifications on all Mercury equipment. Available within sixty days. Order early on your company letterhead.



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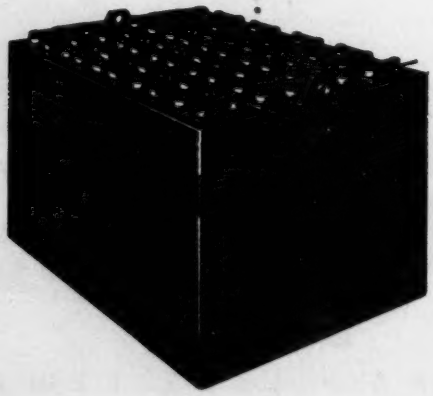

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Flow

The magazine which integrates material handling equipment into the flow of production.

Vol. 1, No. 6

MARCH
1946

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COVER PHOTO—Bowling pins nearing completion at the Brunswick-Balke-Collender Co., Muskegon plant. Many clever handling devices are used in their mass-production. These pins, moving left on the first line, first pass under the top sanding machine, then double back to the spray booths. See complete story, page 32.

The Die is Cast
FOR BETTER HANDLING

How a complex handling problem was solved in a plant of the world's largest producer of die castings. The facilities handle ingots, molten metal, many types of products through numerous work stations, including shipping, and provide for systematic scrap removal. Result: saving of manhours and floor space.

Ingots are palletized from the cars, tiered to ceiling in storage, moved quickly to production in foundry departments.

By FRANK M. ROSENBERRY,
Manager
Material Handling and Traffic Department
Doehler-Jarvis Corporation, Pottstown, Pa.

AT OUR company we have consistently endeavored over a number of years to mechanize the various operations in order to reduce excess handling, save precious floor space, and streamline the flow of material within and between the various departments. The weight of the individual die castings may be anywhere from 1/100 of a pound to 50 pounds. But whether the product be a needle holder for a record player tone arm or a bulky automobile grille, our facilities are constantly being studied with a view to moving the products to and from the numerous operations with the least number of handlings. This is a cardinal point of our program and it applies to all operations—from the raw material to the finished product stage.

This plant of our company, for example, consumes an average daily volume of 50 tons of aluminum and zinc ingots. If this tonnage were handled and rehandled an average of 10 times, the actual daily weight moved would amount to 500 instead of 50 tons. This, in turn, would mean a correspondingly larger working force (for handling), as well as more floor space and more production time. An example of the reduction of the number of handlings may be found in our present receiving and storage practices for ingots.

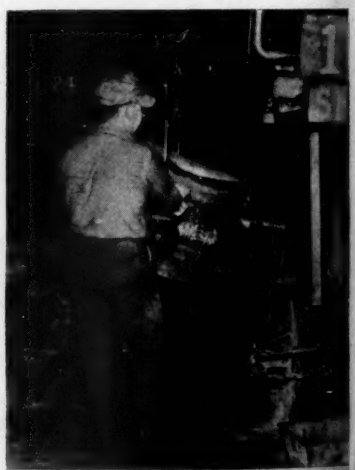
Raw Material Is Palletized

Our products fall into two main categories — aluminum and zinc castings. For each a separate foundry and production conveyor line is maintained. The ingots—aluminum and zinc—arrive by freight car and truck. Previously the product was loaded from the carriers on skids. In the storage area the individual ingots were hand stacked on the stock pile. When they had to be moved to the furnaces, it was again necessary to unstack each ingot individually by hand. Thus, from the freight cars to the furnaces, there were three separate handlings.

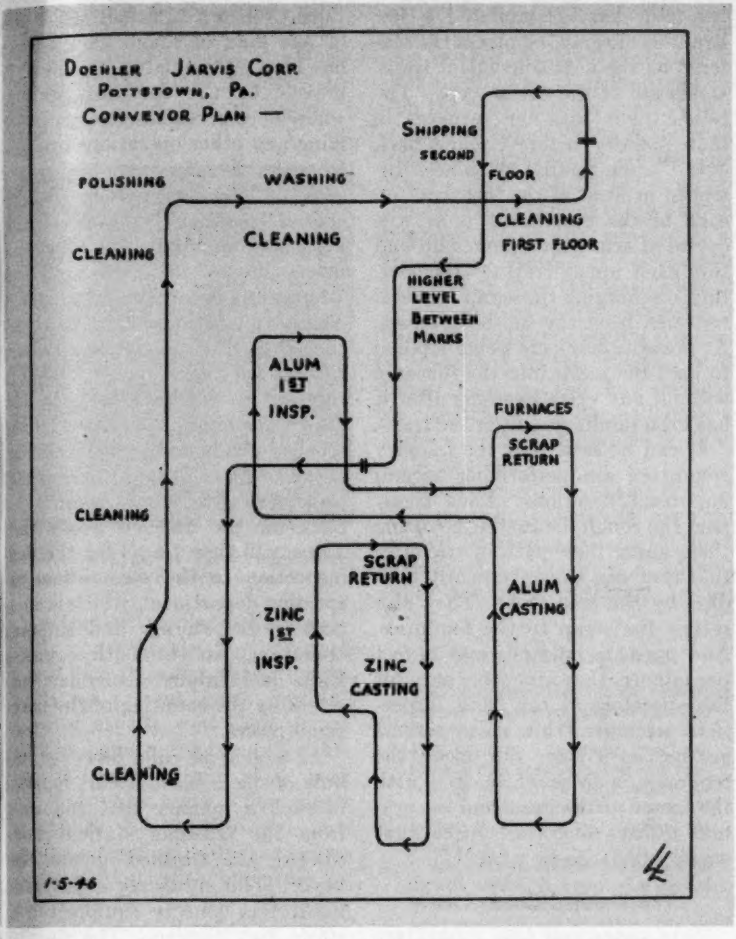
Recently we realized our plans for palletizing the raw material. The incoming ingots are now palletized (approximately one ton to a pallet) and moved by fork truck to the storage area. Here the loads are tiered three high, and by the same method a ton of material is moved (in a matter of minutes) to the furnaces.

As a result, three handlings have been reduced to one, with a consequent reduction in manhours and "handling" dollars. Hours have been literally reduced to minutes, particularly in the stacking and unstacking operations. The palletization of these loads has provided additional manpower for production purposes in the plant. The availability of this added manpower has been an important advantage since the company's present volume has increased more than 100 per cent since pre-war days.

By use of the fork trucks we may also be able to realize our present plans of mechanizing the handling of the ingots into the furnaces,



Tilting bucket that serves die casting machines in aluminum foundry — convenient, safe handling is assured.



Diagrams of three conveyor lines, with departments along line of travel.

which would mean a further reduction in the per-ton handling cost. This is one of several examples of improvements we hope to carry out within the months just ahead.

Molten Metal Safely Handled

The batteries of die casting machines in the foundries are likewise served by means of mechanical aids specifically designed for their particular purposes.

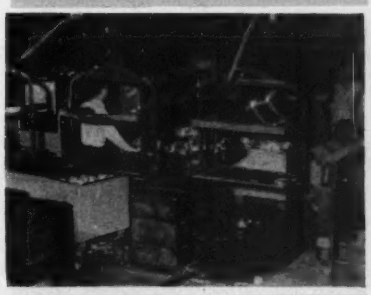
Aluminum foundry: The aluminum pots are of the tilting type and are suspended from trolleys operating on a monorail. When the pots have been loaded at the furnaces, they are readily hoisted to the desired height and rolled along the main aisle between the aluminum die casting machines. The tilting device on each pot permits the operator to manipulate the heavy vessel with safety and to discharge the liquid metal with minimum effort into the holding pots of the machines. Thus the overhead rail system provides both safety and speed in the handling of the hot loads. While scores of machines must be served constantly, the task is performed by only two operators on each shift. This would not be the case if the metal had to be ladled laboriously by hand—a practice that is still fresh in the minds of many metal fabricating operators.

Zinc Foundry: While the chemical characteristics of aluminum require this metal to be poured from pots, the properties of zinc permit it to be pumped. Hence a different method (and equipment) is used for transporting the molten zinc from the furnace to the die casting machines. Three pots are mounted on a trolley that runs on a track laid down the center of the zinc foundry aisle between two rows of die casting machines. This trolley, or car, operates electrically and each of its pots has a capacity of 1,000 lbs. They are loaded by pumping from the furnace, and the same pump discharges the metal into the holding pots of the die casting machines. By use of this flanged car, one operator without difficulty serves the 50 machines located in this department. The aisle in each foundry measures approximately 265 feet.

Routing Millions of Pieces

Scores of hissing die casting machines in quick tempo pound out literally millions of die castings in a short time. The machines are spaced closely and it would be difficult (without increasing the floor area) to provide on-the-floor receptacles for the castings being produced. Hence the products are moved out by means of an overhead chain conveyor equipped with double-deck trays. The upper tray is approximately 18 inches above the lower one. The lower tray passes within a few inches over the discharge end of the die casting machines, within convenient reach of the operators. Incidentally, an installation of this kind serves both the aluminum and the zinc foundries. The length of both conveyors is about 1,750 feet. The aluminum casting conveyor measures 1,050 feet, with the remaining 700 feet accounted for by the zinc casting

Trolley readily moves large-capacity zinc pots; one operator serves many die casting machines in the zinc foundry.



Double-deck carriers on conveyor line that delivers castings to finishing, and returns scrap to the furnaces.

line in the zinc foundry.

As each operator accumulates several die castings on a small ledge in his booth, he places them on one

Return Line: Note scrap on top tray, which is automatically discharged in front of the furnace. Scrap is no problem.

of the passing trays. This takes care of the transporting problem. The conveyor circles the entire foundry room, passing conveniently near each machine. It moves out through a wall opening and carries the loaded trays past the "first inspection" stations in the finishing room.

At the numerous stations the trays pass at a sufficiently low level for each inspector to see if the castings are for him or for another station. (The operators are briefed at the start of every working day on the type of castings their particular stations will handle.) Because of the length of the conveyors, the castings on the trays are sufficiently cool to be conveniently handled by the time they arrive at the inspection stations.

After removal, the operator breaks off the individual castings held together by the "gate"—the connecting medium between the source of the metal supply and the molds. This excess metal is of course the scrap that must be returned to the foundries. Depending on their size, a single gate may contain as many as 36 individual castings, and the scrap thus amounts to a considerable portion of the total weight of a "shot."

How Scrap Returns to Furnaces

It was previously mentioned that the foundry conveyors are equipped with double-decked trays. While the rough die castings travel on the lower trays, the scrap is moved out on the upper ones. As soon as an inspector has accumulated a few handfuls of scrap, he places the material on the next convenient trays, which are of the tilting type. The return lines pass the furnaces in each foundry before circling back over the die casting machines. Installed in front of the furnaces (on each of the two lines) is an air-operated arm which moves up and tilts each upper tray as it passes, thus discharging the scrap material returned from the finishing rooms. At present, plans are being studied to load the scrap into the furnaces without any extra handling after it has been discharged from the trays.

It can be seen that the foundry conveyors are performing several important functions. They transport the rough die castings, cooling them along their path of travel so that they can be conveniently handled by the inspectors. They also return the scrap to the foundries. And since the lines move at 70 feet per minute, they also set a pace for the operators at the "first inspection" stations. While these workers are not on a piece rate basis, the tendency is to move in step with the tempo of the line. And the system utilizes overhead space that would otherwise be wasted.

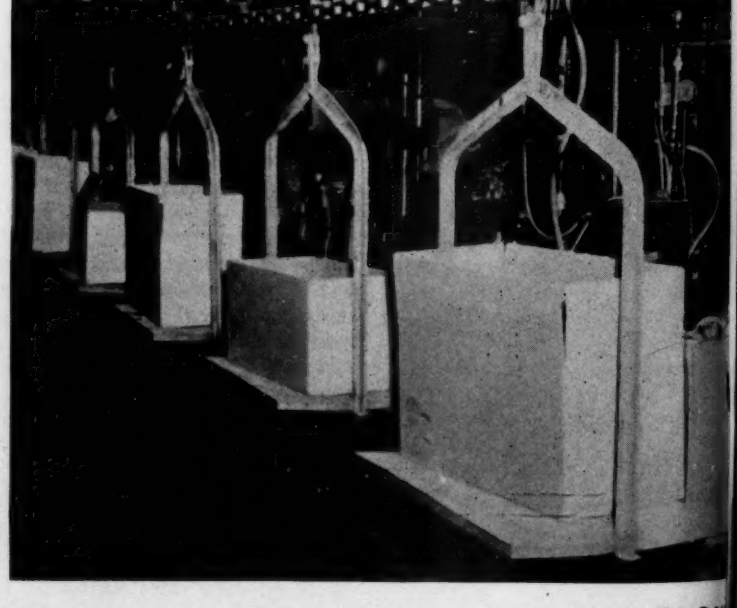
The Finished Goods Line

Tote boxes and tote trucks are an important medium for moving and storing the myriad of die castings at the many inspection stations. When a sufficient stock pile of one kind of rough die castings has been accumulated, the work is moved to the finishing station, where boring, reaming, power press, filing and other operations are performed.

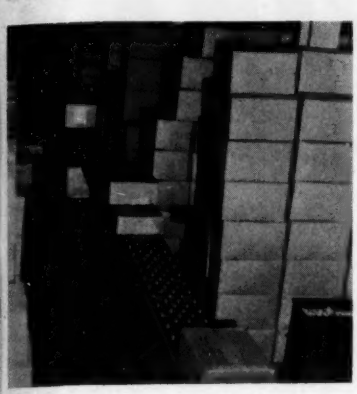
When specific products require special treatment such as a drilling operation, they will of course be moved in tote trucks or boxes (depending on their size) to the necessary stations and then returned to the line. Or large quantities of very small pieces, loaded in tote boxes, will have to be moved (after finishing operations) on the finished goods conveyor to the degreaser. After drying, these pieces are returned to tote boxes and put back on the finished goods line. These will then travel for the final inspection to the second-floor inspection department, which is adjacent to the storage and shipping operation. An automatic counting scale, incidentally, expedites considerably the counting of the many small pieces.

As a general rule, however, the bulk of the die castings are handled in such a manner that the work from the finishing stations flows toward the finished goods conveyor. This measures about 1,300 lineal feet and is equipped with single tray carriers. The work at each station moves toward the final inspector, who places the castings in corrugated containers and de-

This finished goods line takes inspected castings to storage area. The trays are slightly concave.



posits the full cases on a tray passing within his reach. As previously indicated, the finished goods are carried to the second-floor storage area.



In storage area, gravity wheel conveyor lines conveniently move products to stock piles.

Another of the planned improvements concerns the flow of work within the finishing departments. While at present each finishing operator usually works out of one truck into another, (placed on either side of him), he will soon work only from one truck. The pieces he finishes will be deposited on a conveyor running down the center of the station, with operators on both sides feeding the take-away line. The fewer number of trucks in the line will permit more men to work in it, enabling the plant to increase production and thus meet the greater demands of the expanding business. Approximately 1,000 feet of additional conveyor lines, already purchased for this purpose, are now merely awaiting installation. As at present, these lines will of course flow toward the main artery of the finished goods line.

Storage and Shipping

As the full cases arrive in the second-floor storage area, they are removed from the trays and placed on gravity wheel and roller conveyors and thus routed to the various stock piles. The latter are arranged according to the geographical sections served by this plant of our company. In one section of the finished goods storage area, a gravity roller conveyor runs the length of a wall. It is the master line to which are attached at right angles several branch lines of gravity wheel conveyor. The transfer from the master line to the wheel conveyors is accomplished without any curved sections. Inserted at each meeting point of the two lines (on the gravity roller conveyor) is a plate on top of which roller bearings are mounted and act as a carrying surface. This plate is of the same width as the conveyor and the bearings are on the same level as the rollers. When it is necessary to shunt cases from the master line to conveyor No. 3, for example, a curved guard rail is simply attached at this point. As the traveling cases bump the guard rail they are readily "switched" on the ball bearing surface to the line branching off at right angles.

The various lines on this floor all lead to a chute which delivers the packed finished goods to the first-floor truck loading dock. A portable roller conveyor, attached to the chute, carries the cases across the loading dock. And from here they travel via telescopic sections of gravity wheel conveyor into the noses of the trucks, eliminating "miles of walking" on the part of the loading operators.

The plant's 10 trucks deliver die castings within a radius of 400 miles of the plant. Not only is care taken to load the outbound vehicles to capacity, but also to see to it that they return to the plant with capacity loads of raw and packing materials. Like the in-plant mechanical handling devices, the two-way haul method has played an important part in reducing the per-ton moving and handling cost.

Loads move speedily from storage into nose of trailer over these portable sections of conveyor.

Plant Manager Howard W. Bartholomew heartily concurs with the writer on these further overall advantages obtained, in addition to lower handling costs. Literally thousands of square feet of floor space were saved by modern handling methods and the lining up of operations in proper sequence —advantages made possible by the mechanical facilities. While inspection and packing operations, for example, previously were separate functions performed in different parts of the plant, today they are concentrated in one area. And the finished work flows smoothly to the storage area. A previous congestion problem has similarly been remedied, and the compact work station are thus enabled to produce to the maximum.

Meantime, we are devoting our energies to the further refinements indicated throughout the article.

Mechanically Speaking

As the upper trays (on the foundry conveyors) approach the air-operated dumping arm, they close a limit switch. This operates a magnetic contactor, which in turn actuates a four-way solenoid air valve. The latter admits air to an air cylinder, which is connected to the actuating arm that "dumps" the hinged trays.

When the air cylinder has completed its full stroke, it operates a second limit switch which releases the magnetic contactor and air valve. The air cylinder is then returned to its normal position, ready for the next tray.

The dumping arm is hinged in the center, to allow it to swing clear of the tray in the event scrap should be hanging over its edges. This flexibility of the arm also prevents damage to the trays or the dumping mechanism in case of mechanical failure.

The double-deck trays on the foundry conveyors are spaced on 58" centers, those on the finished goods line on 64" centers. The dimension of the tray carriers on the foundry lines are approximately 25" x 20"; those of the finished goods conveyor 30" x 20". To prevent cartons of finished material from sliding off the traveling trays, the surface of the latter are slightly depressed in the center. Safe travel for the cases is thus provided even on sharp turns.

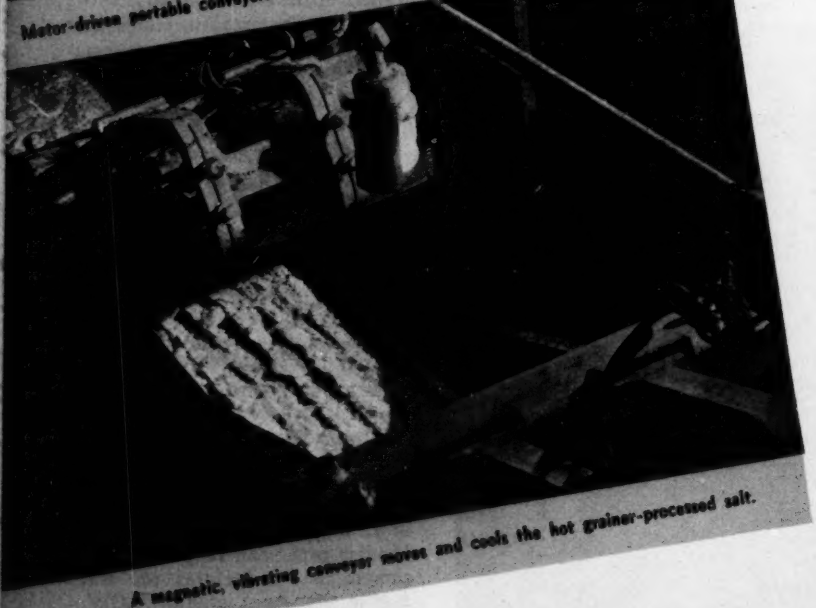
YOUR APRIL ISSUE

A heavy-product plant with low headroom solves a problem with the push-and-pull method of handling units weighing 70,000 lbs.... How a well-known packing house handles the bacon you bring home —operations beyond the much-publicized production line . . . "The last word" at a bottling plant —loading and unloading 240 cases in 12 minutes . . . How a printer handles paper and supplies . . . A sample of the features you will find in your April issue of FLOW.

"Crystal" Clear

A well engineered system for moving millions of pounds of bulk and packaged products—the story of the Diamond Crystal Salt Co., Inc.

Motor-driven portable conveyors carry the large bags away from the filling stations.



A magnetic, vibrating conveyor moves and cools the hot grainer-processed salt.

THE tonnage at this St. Clair, Michigan, plant, a division of General Foods, moves by flotation, various types of conveyors and industrial trucks. The raw material is mined hydraulically, and wells are sunk into a salt layer about a half mile below the ground. Water is pumped down a pipe to form a salt lake, and the heaviest brine is then forced up by pressure. As the salt is pumped to the surface it is partially refined and purified at the same time. The reason is that insoluble rock and other impurities are left behind in the process.

Once the salt has reached the surface, it is refined by the grainer, vacuum pan or Alberger system—a combination said to be unique when found in one plant. Salt produced by the Alberger process, a pure flake product adapted for food processing, constitutes the bulk of the company's output. It is shipped all over the United States as well as to foreign countries. (Some data on battery and truck maintenance are included in later paragraphs.)

Note: While each of the three processes mentioned differs in the method of evaporation and removal of impurities, as well as in the equipment used, the movement of the product during the initial processing stages (in brine form) is both by gravity and aid of pumps through pipelines and tanks. The handling operations described here start at the end of these processing operations.

HANDLING

Various types of specialized and standard handling equipment are integrated in the processing and transporting functions of this plant.

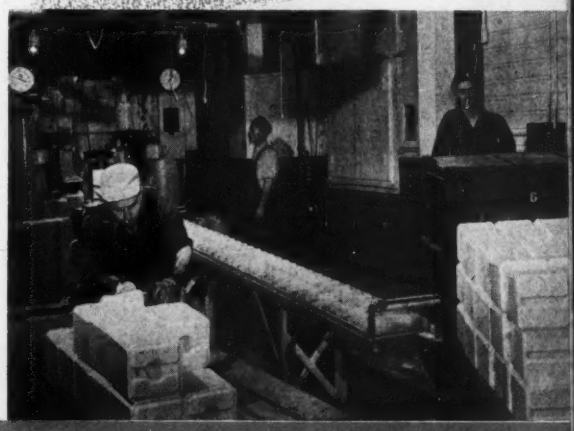
Handling Is Part of Processing

The grainer method of salt processing involves the use of magnetic vibrating conveyors, on which the product is cooled, and hence movement of the material is at times a part of the processing methods. As these conveyors move the product, after screening and drying, they also cool the hot salt, and shake it to prevent caking and lumping. Most important, the crystals of salt are not damaged or broken while in transit. It is desirable that they retain their original crystal form.

After leaving the filter, the salt has a temperature of 450°F, which is too hot for handling the product on dry salt conveying belts that are used elsewhere in the plant. The cooling is accomplished by a stream of water which is sprayed against the underside of the magnetic conveyor. The temperature of the product is thus reduced by conduction as well as by radiation and convection. The carrying surface of the trough over which the salt moves is of stainless steel and is fluted to increase the cooling surface. This is a further aid in counteracting the tendency of the product to cake, which it would do on a flat carrying surface. The idea of a vibrating conveyor as a salt cooler, incidentally, was developed by the company's engineering staff. Its use has largely eliminated salt breakage.

Vacuum pan system: At the end of this process, the product flow is handled by a screw conveyor which moves the salt to a rotary lift. The latter discharges into storage bins, from which the product is funnelled into containers (cartons or bags). Since the action of the screws also breaks up any lumps, it serves a double purpose.

Alberger system: At the end of this process, a rotary drier conveys

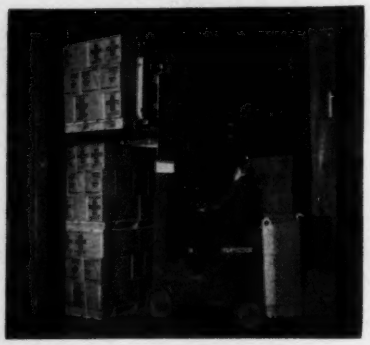


Salt blocks are loaded on skids or pallets after riding gravity rollers from the press.

Orderly arrangement is maintained in salt block storage area by tiered pallet loads.

Tilted surface of slat conveyor, background, provides easy removal of bags to skids.

the salt to a rotary lift, from which it falls on a belt conveyor. The latter discharges on electro-magnetic vibrating screens, from which the salt is dropped into storage bins.



Fork trucks tier palletized loads of packaged salt ceiling high in the warehouse.

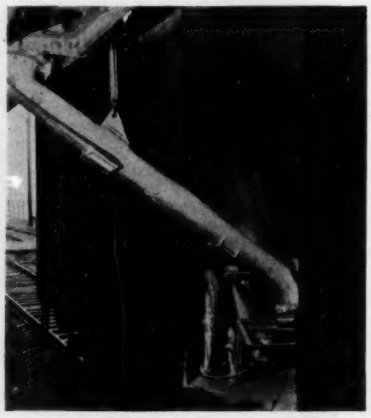
Salt blocks: At the presses, which are fed by an overhead hopper, a belt conveyor is made to perform a double function. It serves as a "take-away" and also transports the blocks to a roller conveyor for removal to pallets. This belt is installed just underneath the die and runs continuously. As the die opens, the finished block falls on the belt and is carried away. Thus the belt provides an automatic discharge, allowing the press operator to concentrate on productive effort.

Handling Finished Products

For loading bulk salt for industrial use, a screw conveyor system and a "slinger" (carloader) are used. Along the loading dock roof run troughs through which the screws push the salt. Several flexible hoses are connected as outlets to this conveyor system. The slinger, placed in the freight car, receives the salt from the overhead conveyor and swirls it into the far ends of the car. Thus the load is properly placed over the axles.

When filling large sacks at the filling machines, portable conveyors are used to move the bags to a 42-inch belt conveyor, which carries the product to a slat conveyor in the shipping department. The portable conveyors, individual motor-driven units, are mounted on casters and are easily moved about. During the filling operation, they are tilted at the proper angle enabling the operator to topple the bags with ease on the carrying surface. Sometimes filled bags land in an upright position on the main line. In such cases the bags are toppled over by striking an extended arm attached to the portable conveyor. This upsets the bags and positions it properly. The arm attachments on the portable conveyors can be seen in one of the photos. This arrangement prevents bags from being torn and makes it unnecessary for the operators to be concerned with bag handling. At the same time lifting tasks are eliminated, making an otherwise heavy task a comparatively easy one.

In the shipping department, the bags are received on a slat conveyor which is tilted sideways and travels past 17 loading stations. (See photo.) The tilted position enables the operators to slide off the bags conveniently at the various unloading stations, where industrial trucks have spotted pallets or skids. While this conveyor



Bulk salt is loaded into freight cars by rapid-moving, continuous belt "slingers."

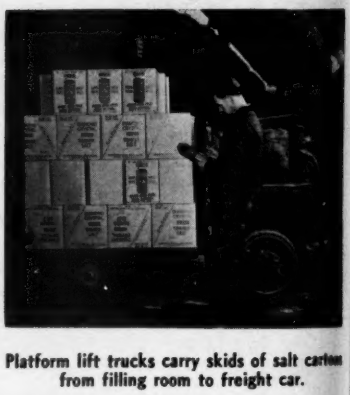
line is in use at present, new plans call for a circular table which will have 26 unloading stations. This revolving table will be motor-driven and two belt conveyors will converge upon it. It will eliminate the possibility of bags passing a station, in which case they must be retrieved by an operator.

The Part of Trucks

Pallets and skids are used for moving bags, case goods and salt blocks from the end of the packing lines directly into freight cars or storage areas. (The major portion of the product is shipped immediately.) A fleet of about 25 fork and platform lift trucks is employed for moving the sizable tonnage. By spotting the outgoing loads for the convenience of the material handlers, the industrial trucks facilitate and speed the loading operations. And since the trucks transport empty pallets and skids on the return trip to the packing lines, they are at the same time an aid to production.

In the warehouses, palletized loads of packaged salt are tiered ceiling-high, making maximum use of storage space. This is also true of incoming loads of paper bags and stock for other containers. The handling of these loads by the pallet-and-fork-truck method has eliminated many hours formerly spent in piling by hand. Whenever the company finds it practical, the material is palletized, and this method is gradually being extended. Palletization has not only reduced damage losses to packaged materials, but has also aided the maintaining of inventory controls. And, while accurate spotting and tiering of loads has contributed considerably to good housekeeping, the palletized material is kept off the floor. This is an important consideration with a product which must be kept dry.

The fleet of industrial trucks has also been of value in another way. Some years ago it used to be a problem to move the heavy loads up and down inclined ramps which



Platform lift trucks carry skids of salt cartons from filling room to freight car.

exist in many of the buildings. The powered trucks in use today have provided the answer to a problem of an operation that was both hazardous and fatiguing.

Careful Maintenance Practices

A systematic maintenance program is rigidly observed. The maintenance and battery charging department has several controls and

(Turn to page 42)

a "SHELF-MADE" Solution

By R. J. FINNEGAN
Chief Industrial Engineer
The Weatherhead Co., Cleveland

In this order picking and shipping operation, the handling of thousands of varieties of small parts is simplified by the use of proper stockroom facilities and procedures.

THE Cleveland factory of The Weatherhead Company is a big plant—400,000 square feet in two buildings—with many small parts. The major portion of the plant is devoted to the manufacture of tube fittings and flexible hose assemblies, now used chiefly by the automotive industry. (During the war, a large volume of these products was produced for Army and Navy aircraft as well as for numerous types of ordnance equipment.) Weatherhead parts also include valves and cylinders, which are manufactured for industries in the refrigeration, Diesel, marine, railroad, and other fields.

The company's production runs over a million of small parts a day, numbering several tens of thousands of different items and sizes. While the bulk of the items made today is manufactured and shipped as original equipment for the automotive industry, a considerable portion also flows to several thousand jobbers and distributors throughout the country. The "industrial" orders (original parts for automobile manufacturers) are shipped in bulk form, but the same items for the jobbing trade are packaged and handled in smaller quantities. After final inspection, these small precision parts must be handled a number of times through classification, packaging, order picking and packing. While this operation is the main interest of this article, the somewhat simpler handling of the bulk orders will be

Orders are picked from well-arranged stock shelves and placed on shelf trucks, above.

●

After inspection, parts are transferred from tier skid to shop boxes, lower left.

●

Material is moved from packaging area on supply trucks and placed on shelves, below.

indicated in later paragraphs.

In view of the many small items handled daily, the operation could conceivably be a complicated one; but it proceeds with noticeable smoothness in the automotive jobbing stock department of The Weatherhead Company. Suitable stockroom facilities, handling methods and office procedures are all designed to this end.

Fittings Go to Stock Shelves

The material, placed in tote boxes, arrives from inspection in the receiving bay of the jobbing stock department on tier skids. The individual tote boxes are placed beside each other on the shelves of these units. This prevents the stacking of full tote boxes on top of each other and thus avoids damaging the parts. Each tier skid, equipped with four shelves, accommodates numerous tote boxes and is moved by means of hand lift trucks. Incidentally, the individual hauls are relatively short.

The loads are delivered to the head of a roller conveyor line, on which wooden shop boxes have been placed. The product is transferred to these wooden containers, and the empty tote boxes are immediately returned to production. The loaded shop boxes travel on the conveyor line to a counting scale, and here the move tickets for the individual loads are handed to a record clerk. She enters the quantities received on a daily stockroom report for finished parts. This sheet is then transmitted to

Loaded shelf trucks are delivered to packing stations located parallel to a conveyor line.

the office for entry on the inventory stock record card which is kept for each type of item. (While the company makes as many as 30,000 different items and sizes, only a fraction of this total will be on hand on the jobbing stock shelves at any given time.)

The clerk at the scale also makes

The heavier cases, ready for shipment, are securely fastened with ½-inch steel strapping.

out individual identification cards for each part number, and the cards are then stapled to the front ends of the wooden boxes.

In the area immediately beyond the scale, the shop boxes are placed on skids according to type and size, and the classified bulk material is then moved to the stock shelves. The material handler notes the shelf location of each item on the daily stockroom report. From information obtained from the daily stockroom report of Finished Parts Received, and the ditto record sheet showing parts taken out of the racks, a clerk in the central office makes out stock records and stock location cards. These give her a running inventory of all stock kept on the shelves as well as the exact location of each part as to rack, section, and shelf.

Packaging and Order Picking

A simple location system is designed to prevent any possible confusion or delays. Locations are indicated by rack numbers, which are plainly marked on the aisle side of every row of shelves. Further, every section in each row is numbered, and each shelf also carries its individual number. The stock record system also distinguishes between the shelves carrying the bulk stock and those on which are kept the items already packaged. Thus the rack numbers for the bulk stock start with 50—and anything below 50 indicates locations used for packaged materials.

The packaged stock is replenished daily, on the basis of figures issued by the office. (A report on low stocks is regularly handed to the office for this purpose). The bulk stocks are then withdrawn and moved to the packaging stations. Here the pieces are counted and put in standard quantities (according to the jobbing catalog) in small cartons. A large jobbing order will, of course, be filled directly out of bulk stock and packaged specially, thus avoiding excessive decrease of the packaged items on the shelves. Note: the larger "industrial" orders are counted by means of counting scales.

The packaged items, on the other hand, are counted manually into the small cartons. Various attempts have been made in the past to mechanize this part of the operation, but manual handling has been found preferable in the long run. The explanation given is that many job lots are constantly involved and that the varieties of the items change frequently.

The packaged products are placed on supply trucks, on which the loads are moved to the shelf locations. These caster-mounted trucks are approximately 20″ wide, 45″ high, and 27″ long—compact units that can be readily maneuvered through narrow aisle spaces between the racks.

The layout of the department, incidentally, is an aid to the overall handling operation. For example, the initial weighing, recording

Larger industrial orders are counted by means of counting scales and shipped in bulk form.

of weights, classifying and packaging are all done in space that is parallel and adjacent to the bulk and packaged material stock racks.

The stock picking operation is

(Turn to page 42)

Why a BG Bucket Loader Loads faster from Stock Piles

• Barber-Greene Bucket Loaders are designed specifically for picking up material from stock piles and loading to trucks or processing equipment faster and cheaper than any other method.

Continuous, powerful crowding speeds—plus spiral feeding on the front end—loads every bucket to the maximum, thus maintaining peak capacity throughout the day. There is no problem of operator efficiency; he merely keeps the machine to the working face. Clean pickup eliminates accessory equipment and excessive hand shoveling. Capacities of 1½ to 3 cubic yards per minute produce high tonnage per hour.

The Barber-Greene Catalog No. 82 illustrates and describes the various Bucket Loaders that will best meet your particular material handling problem. Barber-Greene Company, Aurora, Illinois.

BG Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

Elsie Gets a LIFT

Cooperation between a carrier and shipper results in a neatly coordinated handling operation —and dividends in reduced time, man-hours and effort.

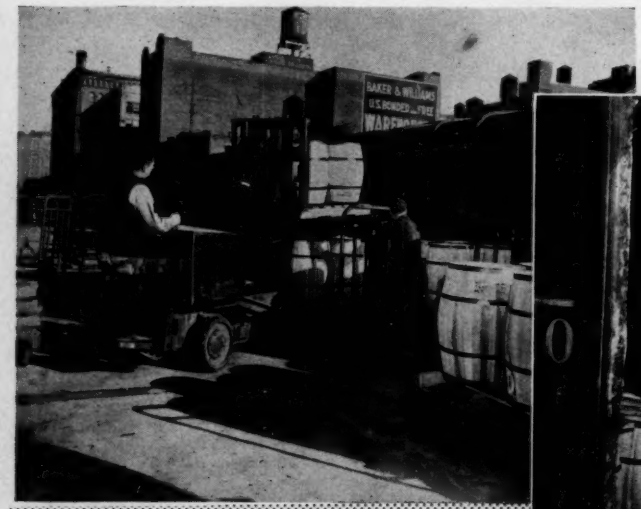
This is Borden's famous Elsie. Modern power handling on pallets speeds her products to market.

THIS is a story of cooperation —between the Borden Company and the New York Central System—in which both parties benefit from the joint effort.

The scene is the New York Central St. John's Park Freight Terminal, New York City, in which the Borden Company occupies about 50,000 square feet of floor space (on the third floor). During the course of a year the Borden Company receives and ships approximately 2,000,000 pieces. The cartons, plywood drums and barrels handled contain a variety of food products—condensed and evaporated milk, mince meat and dehydrated milk, coffee and candy, and other products of Elsie.

The goods arrive by freight car (on the second-floor level) and must be moved by elevator to the third-floor warehouse area. If these hundreds of thousands of units were handled manually at every stage—but that is precisely what the cooperative effort is eliminating.

The New York Central crews unload the cases or barrels or drums on pallets which have been placed on 4-wheel flat trucks. The individual palletized loads weigh up to one ton and number from 40 to 60 cases each, depending on the type and weight of the product. When cases are unloaded from the cars, the units are bound by reversing



To speed movement of goods to warehouse, lighter loads may be double tiered on trailers.

Arriving loads of Elsie's products—here, powdered buttermilk—are palletized in freight car.

each layer. This makes for safe power handling of the loads later.

Cooperation Pays Dividends

If the car being unloaded is spotted near the elevator, the loaded flat trucks are simply pushed over to it for handling by the elevator operator. But if the car is at some distance from the elevator, the pallet-bearing trailers are coupled into trains—usually of six units each—and hauled the several hundred feet to the elevator by tractor.

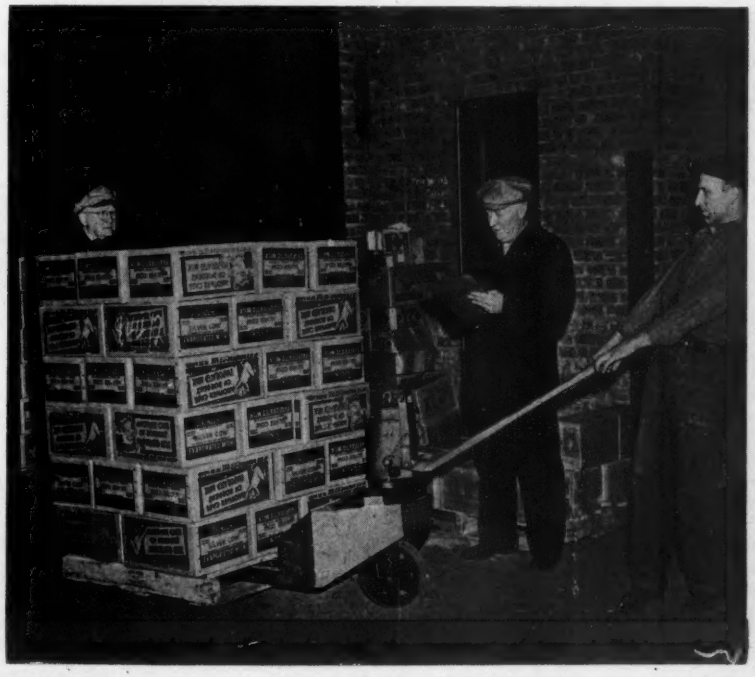
The loaded trailers are arranged on the elevator and brought to the third floor in a matter of minutes. The elevator has a capacity of 10 tons, is equipped with doors at either end, is self-leveling, and is situated for maximum accessibility by the loads. On the third floor, the elevator is as quickly discharged as it was loaded.

In the warehouse area the Borden Company operates two fork trucks of one-ton capacity each, which go to work on the arriving loads. Again, a pallet load is quickly picked off by a fork truck, moved to the assigned aisle and tiered in the proper stack. Case goods are usually stacked three layers high, while plywood drums (of dehydrated milk) are stacked five high. Barrels of powdered milk (weighing about 225 lbs. each) are usually stacked and unstacked two pallet loads at a time. In any case, full use is made of the cube since the products are stacked to within a few inches of the ceiling.

The benefit to the New York Central System is, of course, that it receives the empty flat trucks soon after they are sent up on the elevator. If the cases were unloaded directly on the trailers, and then had to be taken off singly by hand, the return of the empties would take hours. And the shipper's advantage is that untold additional manhours would be required if the merchandise were not handled as palletized unit loads. A more specific idea of the actual saving is given in a later paragraph.

The spotting or positioning of the loaded trailers on the warehouse floor contributes materially to the speed of the unloading operation, according to Borden's Warehouse Superintendent William H. Smith. As numerous flat trucks arrive from the track floor, they are so lined up that the fork truck operators do not have to travel any unnecessary distance or maneuver in tight quarters between waiting

units. The loads are lined up along the main aisle, where they are readily accessible to the forks of the trucks. Empties are promptly removed. When the loaded trailers arrive in rapid succession by elevator one warehouse operator is usually assigned to position the



loads for maximum convenience of the truck operators. In view of this, it can be readily seen how a carload — numbering anywhere from 1,000 to 3,000 cases — can be stacked away in one hour.

From Warehouse to Trucks

From the warehouse, the goods are sent by truck to stores in the Greater New York area. In this operation the fork trucks and the elevator are again coordinated in an efficient handling method, but this time in conjunction with pallet hand lift trucks.

NOTE: All merchandise for case orders to be delivered on a given day is totalled on the previous day, enabling the warehouse foreman to assemble *solid pallet loads* of each type needed for shipment, instead

(Turn to page 52)

The How and Why of CONVEYOR BEARING MAINTENANCE

By Charles W. Hagues

Conveyors servicing furnaces, drying ovens and pickling plants cause the conveyor engineer much concern on the question of lubrication. This article describes two such plants and outlines a method for overcoming this difficulty.

DURING recent years a good deal of attention has been devoted to the mechanization of handling processes in all types of furnaces, drying ovens and pickling plants, and in the rust-preventive spraying of metal parts. These various processes usually give the engineer a serious problem in maintenance and upkeep—particularly as to oil and lubrication.

Experience by the writer of two such plants will no doubt be of interest. These are:

(1) Spray-bonderising of metal parts prior to enamelling. (2) Drying of dipped and sprayed enamelled metal parts.

The former plant is of more than usual interest from a maintenance angle, as the system incorporates an alkaline spray which, of course, robs the overhead chain conveyor trolley rollers of their lubricating grease and oil. Owing to other design requirements of the plant, it is not a practical job entirely to protect the chain from the spray foam. The suspension carrier from the chain, carrying parts to be sprayed, must pass into chambers of alkaline, hot water, and Bonderite rust-proofing solutions consecutively.

Various bearings and bearing material were tried with a view to overcoming the difficulties experienced, and after prolonged experiments of an involved nature it was decided to turn over completely to a metallized graphite bush in the trolley bearings. . . .

During the experiments, a number of these bearings were fitted to standard trolleys, and pins were made to suit (Figs. 1 and 2). After exhaustive tests and a running period of 5,000 hours, it was interesting to note the greatly reduced wear and tear on both the bearings and the pins. The actual figures are appended below:

Wear on bearings 0.010 in. min., 0.202 in. max.

Wear on pins—0.010 in. max.

The interesting feature, from the maintenance engineer's point of view, occasioned by the use of this material, is the low upkeep cost of the conveyor, as renewal of the bearings is very much less frequent. During a period of between six and seven years, this plant has been in constant operation for 15 hours daily, giving a total run of 33,000 working hours, and only 60 bushes have been renewed out of a total of 300 on the entire conveyor circuit which passes through the process. The trolley pins show wear as previously stated, and the replacements of these are even less than with the bushes. With regard to the cleaning of the chain and trolleys on this conveyor, many trials and tribulations were encountered before a solution was found. The method finally used by the writer, which solved all problems, was as follows:

An extra 40-ft. length of chain was made up, similar to that on the con-

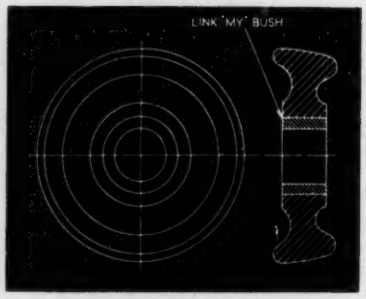


Figure 1—Conveyor Trolley.

veyor, which could be inserted into the circuit. The 40-ft. length in operation could then be dismantled and subjected to shot blasting. This operation thoroughly cleaned the chain links and trolleys and was carried out monthly. This has proved its value completely and has not been detrimental to the working parts of the chain.

A few details of the conveyor under review and its cycle of operation may be of interest:

350 ft. length, 28 in. pitch double roller suspension.

Roller r.p.m. 30; temperature of oven 450° F.

Roller shaft pins of steel; bearing ¾ in. long X. 1⅛ in. o/d X ¾ in. i/d.

1. Metal cleaner at 190° F.
2. Hot water at 180°F.
3. Hot water at 180°F.
4. Bonderite at 180°F.
5. Hot water at 180°F.
6. Chromate rinse at 170°F.
7. Drying oven at 450°F.

From the valuable experience obtained in the spray bonderiser plant, it was decided to incorporate similar

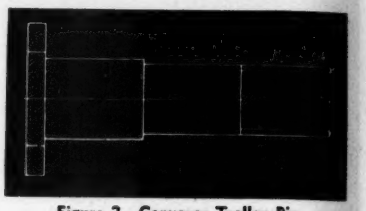


Figure 2—Conveyor Trolley Pin.

bushes in an overhead chain conveyor carrying sprayed and dipped enamelled parts through a drying oven. This at once effected a big improvement in the running and maintenance also of this conveyor. No replacements have been necessary since installing the material in 1939. It will also be appreciated that a big saving in oil consumption and labor has been achieved. Furthermore, the possibility of oil dripping on to metal parts has been eliminated, a vital advantage when carrying "wet" parts for drying.

In the view of the writer, who has been actively interested for many years in both the theoretical and practical aspects of material handling in many processes, these striking results must be of considerable interest to many other engineers similarly engaged. They show that a great saving in trouble and expense can be achieved in many conveyor systems by using bearing bushes in self-lubricating materials. In particular can be mentioned conveyors used in the following:

Chemical trades, cloth trades, paper trades, food preparation trades.

Many readers will call to mind examples of the use in these industries of conveyor systems in which the lubrication problems which beset the engineer could be completely solved by employing these special graphite bearing bushes.

The lubricant properties are inherent in the material itself and no oil, grease, or other separately applied lubricant whatever is required.

Courtesy, Mechanical Handling, November, 1945.

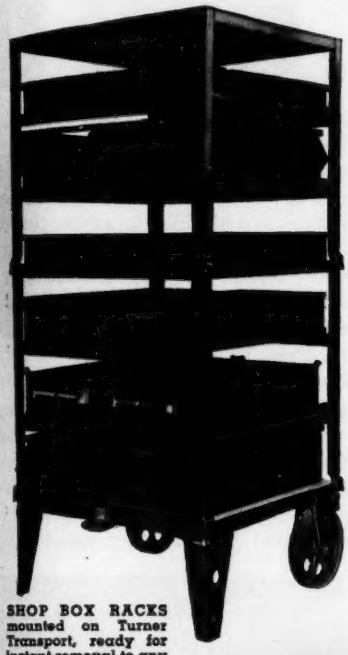
The Judge says - 60 DAYS!

FREE TRIAL

without Penalty or Obligation

if you've been GUILTY *of NOT Using the*

TURNER SYSTEM
OF MATERIALS HANDLING



SHOP BOX RACKS mounted on Turner Transport, ready for instant removal to any part of the shop.

For shame! Without the TURNER SYSTEM you have failed to utilize a method which has saved up to 50% in *Labor Cost, Floor Space* and *Equipment Cost* for hundreds of leading manufacturers.

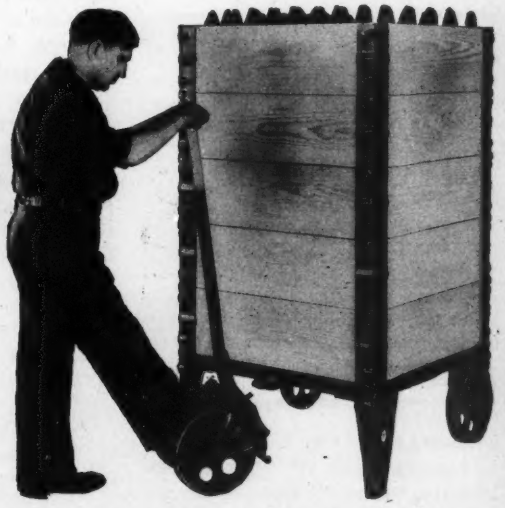
We are so sure that you can benefit as well from the use of this system that we are willing to ship an assortment of standard units for 60 DAYS FREE TRIAL. Use them for at least two months. Keep them if (in your opinion) they save *labor, time,* and *space.* Return them if they don't. There is absolutely no obligation, except that you assume nominal transportation charges.

The *complete* system is outlined in a twenty-page book which is sent to you without charge.

WRITE ON YOUR LETTERHEAD FOR YOUR COPY OF THE TURNER SYSTEM BOOK.

FLOOR PLATE DECK TRANSPORT provides point contact with hot materials. Non-skid embossments hold materials on deck.

WHEELING SHOP BOX carries other loaded **SHOP BOXES.**



The square Transport is the foundational unit of the Turner System. It can be moved in restricted space by the hand Jimmy, power lift truck, crane or conveyor. Steel or Wood Bin Sections or Section Trays lock one on another on the Transport for vertical expansion.

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A balanced movement of raw materials and work-in-process does an effective job at the Detroit Steel Products Co.

OPERATIONS at the Detroit Steel Products Co., manufacturers of steel casements for windows, are distinguished by several noteworthy features. One of these is a straight-line product flow that makes effective use of mechanical handling aids. The latter are well adapted to the layout. Other factors that make for a balanced movement of raw material and work-in-process are: planned storage areas, special racks, and work station layout, all of which make possible short moves of the product.

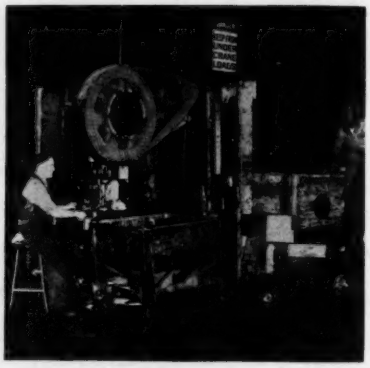
Crane Handles Raw Material

Rolled bar stock and sash bar stock come into the building in

Bar stock, in steel batch box with open ends, is positioned by articulated truck here.

gondola cars, which are spotted under the span of an overhead traveling crane. It handles all raw materials stored in an area comprising two bays. In one operation, the stock is unloaded from the cars and placed in racks as near as possible to the machines in which they will be used. To receive bar stock as it is removed for machining are roller table feeds, which extend from beneath the span of the crane to the machines.

The cab-controlled crane allows the operator to spot loads accurately because of his ability to see the entire operation below. Single rails overhead with electrical con-



Heavy batch box for mill parts, being positioned by truck at discharge end of press.

tacts are spaced a few feet apart over the storage area in the adjoining bay. Any one of these rails can be interlocked with the bridge of the crane, permitting the cab unit and trolley carrier to take loads into and out of this bay.

After the pieces of bar stock are cut to length, they are transported in box-type skids by hand or fork lift trucks with articulated frames, depending on the length of the move. The skids used for handling the longer lengths of stock are called batch boxes and are open at two ends. All of the skids are adaptable for tiering.

Temporary Storage Areas

Stock is built up or cut ahead of needs and is taken to racks or bins in areas adjacent to assembly or work stations most likely to use it. Because of the variation in sizes of pieces and in sequence of assembly, several of these temporary storage areas are necessary for the production of commercial sash. When practical, the racks are tiered by fork lift trucks.

The trucks transport the pieces on skids through riveting, straightening and assembly operations,

Crane has removed bar stock from rack, right, to roller table that feeds the cut-off machine.

then to a spray booth at the far end of the building. Here the sash is attached by hoist to an overhead monorail and is carried through the spray booth, and then several hundred feet to the warehouse in another building. Here the product is removed to stalls set aside for different kinds of sash and for different orders. The stalls are on either side of the path over which the monorail travels. When an order is to be shipped, a freight car is spotted opposite an opening in the stall, and the sash thus moves the

Assembled sash, traveling on monorail system to spray booth; then to stall in storage area.

least possible distance in loading.

When an order requires crating, the sash continues on the monorail to the far end of the warehouse where the crating operation takes place. A hoist services the area and a telescopic monorail extension carries the created load into the freight car.

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Industrial Trucks do more work...

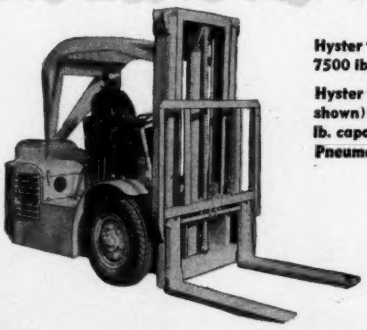
YOUR BUSINESS can cut handling costs and increase net profits when a Hyster industrial truck lifts, transports and stacks materials.

This mechanical expediter on wheels does an amazing amount of work—*saves time and money*—releases manpower for more productive jobs in factory, field or warehouse.

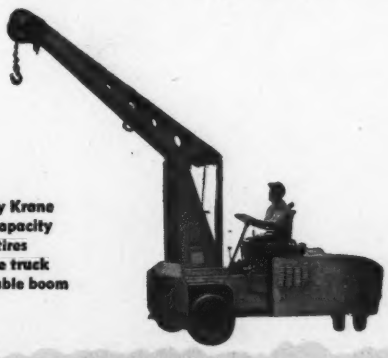
Hyster models range in capacity from 2000 lbs. to 30,000 lbs. All models are *pneumatic tired,* gasoline powered, engineered and built for fast, efficient, enduring service. Illustrated literature sent gladly . . . Distributor sales and service in principal cities.

Hyster "20"
2000 lb. capacity
Pneumatic tires

Hyster "40"
4000 lb. capacity
Pneumatic tires



Hyster "75"
7500 lb. capacity
Hyster "150" (not shown) has 15,000 lb. capacity
Pneumatic tires



Hyster Karry Krane
10,000 lb. capacity
Pneumatic tires
Mobile crane truck with adjustable boom

Hyster Straddle Truck "M"
12,000 lb. capacity
Model "MH" (not shown) has 30,000 lb. capacity
Pneumatic tires

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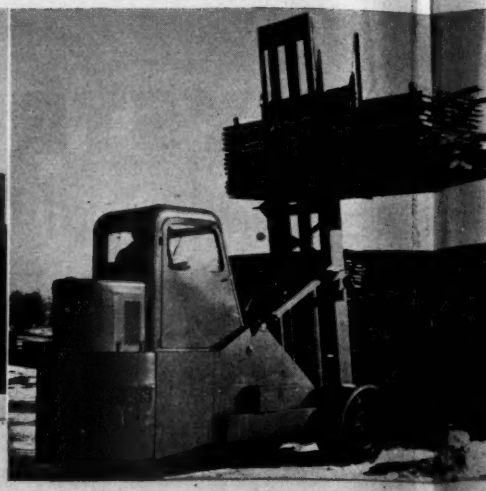


Aiming for a Per

By R. S. GLIDDEN

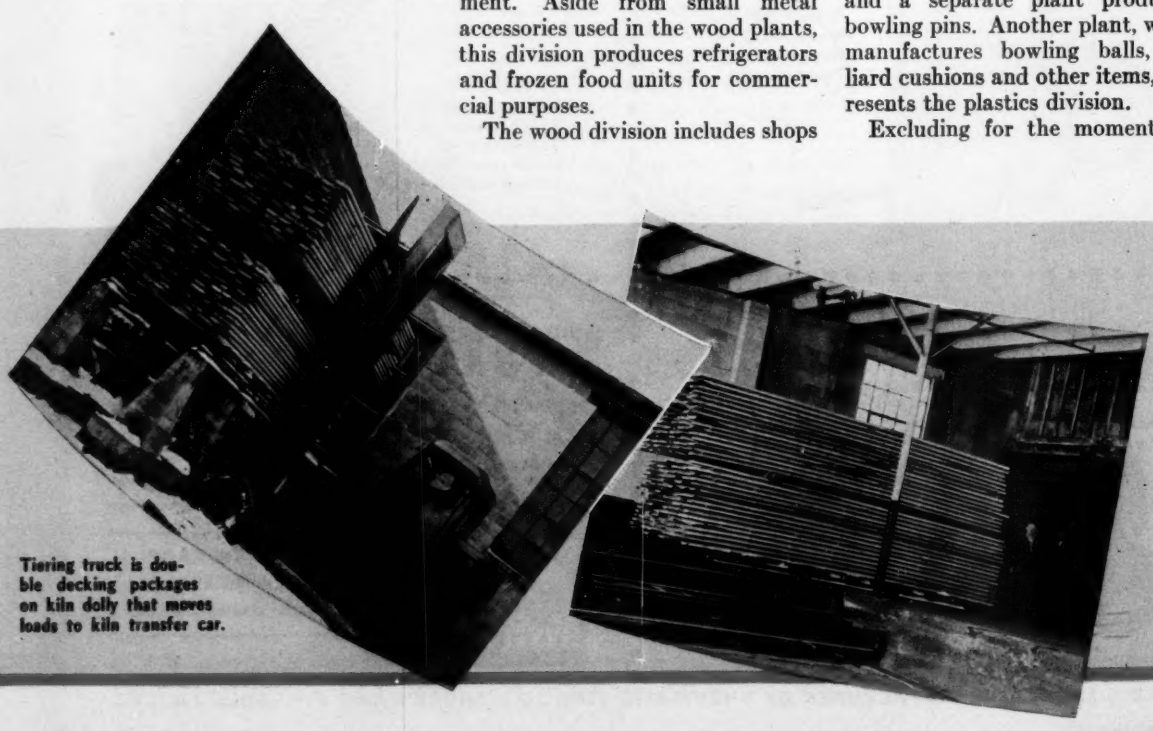
Material Handling and Production Control Department
The Brunswick-Balke-Collender Co.
Muskegon, Michigan

The youth of old companies can be mea
ness of their material handling method
Collender Co., the world's largest pr
billiard equipment, celebrated its ce
phases of its handling program are co
to achieve the best production pict
handling advanc

THE Muskegon plant of the Brunswick - Balke - Collender Company covers diverse operations, embracing both a wood division and a plastics division, among others. A third division, devoted to metals, is mentioned here chiefly for the sake of a complete statement. Aside from small metal accessories used in the wood plants, this division produces refrigerators and frozen food units for commercial purposes.

The wood division includes shops for bowling and billiard equipment, and a separate plant producing bowling pins. Another plant, which manufactures bowling balls, billiard cushions and other items, represents the plastics division.

Excluding for the moment the

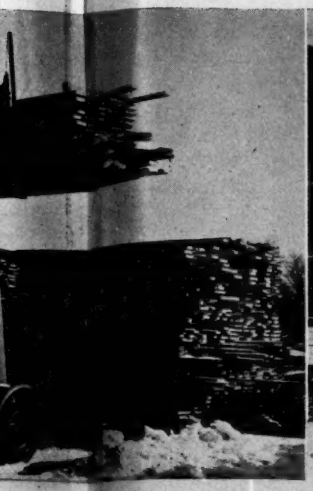


Tiering truck is double decking packages on kiln dolly that moves loads to kiln transfer car.

In kiln building
Without unloading
these 3,000 board fe
of lumber are movin
to kiln, via car, lef

Matcher plant: Part
the conveyor system
carries the load st
through various op
tions, right.

XUM



Perfect Score

Mechanized Handling of Kiln Lumber . . . Bed Stock . . . Crating Lumber . . . Palletized Plastic Materials . . . Mechanized Bowling Pin Plant.

nies can be measured by the up-to-date-andling methods. The Brunswick-Balke-rld's largest producer of bowling and ebrated its centennial in 1945 — and program are constantly being improved roduction picture in light of known andling advances.

1 On the way: Straddle truck transporting package of lumber to piles in Brunswick's lumber yard.

2 The tiering truck then stacks the packages to a height of 17 feet. Note 4" x 4" separators on top.

3 Compare this board-by-board handling, previously used, with present up-to-date mechanized way.

nt, ng ich il- ep- the

pin plant, the wood division in normal times consumes an annual total of 15,000,000 board feet of lumber. (Kiln lumber, bed stock and crating lumber.) In addition to this, the lumber for the pins during a peak peacetime production year may amount to 2,000,000 individual blocks. The plastics division will consume about 60,000 tons of material, chiefly synthetic rubber, per year. These figures are based on peak pre-war production and do not consider the probable larger requirements of our present expansion program which is just beginning to hit its stride.

Throughout the several plants—wood shops, pin plant, plastics division—the pallet and fork truck

In kiln building: Without handling, these 3,000 board feet of lumber are moving to kiln, via car, left.

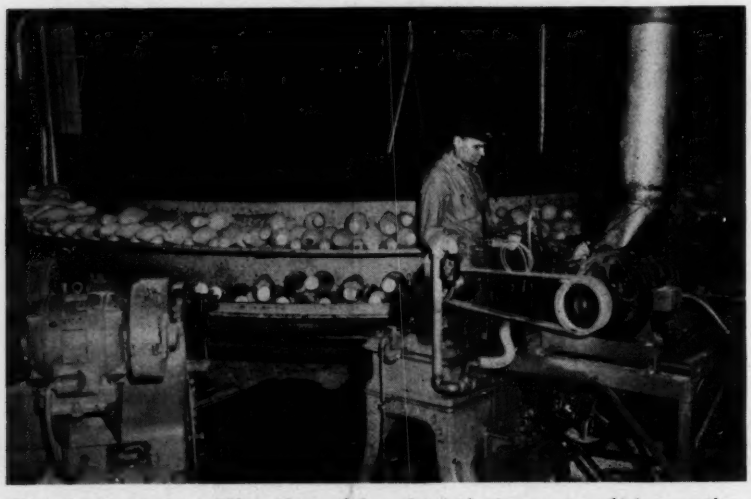
Matcher plant: Part of the conveyor system that carries the bed stock through various operations, at right.

In the mill: Flat trucks move many types of small piece parts from work station to work station.

XUM

method is employed wherever possible. Conveyor systems, special skids, transfer cars, leveling platforms and other handling aids are used for moving and positioning the work in process. More recently, modern, low-cost handling methods have also been introduced in the lumber yard of our company, an innovation which is expected to contribute materially to lower production costs. Thus the pallet method, employed for several years in the factories, is now being matched by the unit load or package method in the lumber yard.

2,100 rough pin blocks being deposited on leveling platform for rough turning in the pin plant.



This is the drum-type turntable, with two shelves, that feeds pins to two machining operations.

Paul Bunyan Handles Lumber

Kiln Lumber: In the lumber yard, the "package" method is comparable to the palletized unit load. Instead of handling lumber piece by piece—to the piles, to the wagons, then to the kiln—the product is power handled in large units by straddle and fork lift trucks.

The lumber arrives loose in gondola, flat or box cars. At the receiving point in the yard it is built on bolsters into packages or units containing from 1,200 to 2,000 board feet each. In the case of green lumber, the package is prepared by placing stringers between the courses of lumber for air drying. Thus a unit with stringers will contain of from 1,200 to 1,500 board feet; a solid package, about 2,000 board feet.

Each unit, measuring about 16 feet long, six feet wide, and four feet high, is picked up by the straddle truck and transported to the piles, where it is deposited. The package is then picked up and stacked on the piles by the tiering truck. This equipment is designed to stack the material to a height of 17 feet "in four layers", with 4"x4" pieces be tween each package serving as separators that provide the necessary underclearance for the truck forks.

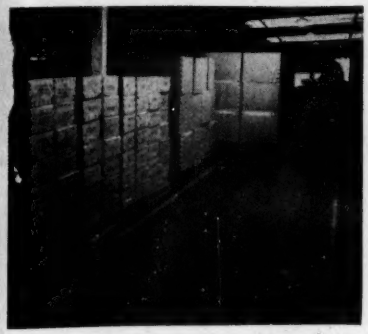
Thus our newly acquired Paul Bunyans—the husky straddle and fork trucks—are economically handling large units at one time, replacing the former tedious and costly piece-by-piece handling. While this method is so recent with us that specific figures on savings are not yet available, the same method elsewhere has been known to reduce over-all handling costs by $50 per car. In our operation, additional savings may be expected to accrue since the lumber must be moved several times for production purposes. Once Brunswick operators have mastered the technique of operating the new straddle and tiering trucks, the results in terms of lower handling costs should be gratifying.

When needed for production, the packages or units are unstacked and again placed on bolsters. The straddle truck picks up the loads and, in a matter of minutes, transports a package to the kiln building. Here it deposits the loads for further power handling. A second tiering truck picks up the packages and places them on a flanged-wheel dolly operating on an elevated track that leads to the transfer car in the kiln building. Incidentally, the truck will stack two packages on each kiln dolly. The load is then moved to the proper kiln bunk by the transfer car, where its tracks are lined up with those on the kiln floor. The whole load, about 3,000 board feet, is then moved into the kiln.

The reader will have noticed that through the several moving operations the package unit has remained undisturbed. The individual pieces have been handled only once (from the cars), which is necessary as long as the lumber arrives in loose form. When it is received as packages, however, they can be conveniently power handled from gondola cars by means of slings which are attached to the forks of the tiering truck.

Compare this streamlined opera-

tion with the three separate handlings previously necessary with manual operations, as follows:



Some variously sized packages of palletized bowling and billiard parts, leaving for shipping.

1. The boards were individually handled from the cars to the piles. 2. When lumber was needed, each board was removed singly and placed on a wagon. 3. At the kiln the load was rolled off the wagon, then restacked board by board on the kiln cars. This comparison explains the previously mentioned reduction in handling cost per car, a figure which would be conservative in our case because the loads must be handled several times.

From the kiln, the lumber is advanced to the cooling sheds, located at a point opposite to the charging end. From here the packaged material, again moving forward, rolls on a second transfer car which is powered. This takes the units to one of several work stations in the mill, where the lumber goes directly to the cut and rip saws, then to further cutting operations. We will meet these parts later.

Bed Stock: To a bowling enthusiast the bowling alley with all its furniture is one complete unit, but to the manufacturer the bed (flooring of an alley) is a distinct and separate product requiring special fabricating and handling equipment. The lumber which goes into the bed of an alley is usually 5/4" maple (though it may be of a different kind), and is prepared in the matcher department.

As in the case of the kiln lumber, the straddle truck will transport the individual packages of the rough product the quarter mile distance from the piles to the yard area adjoining the matcher building. Through a door (that is to be cut wide enough for the 16-foot length of the package) the fork truck will move in the units and stack them four high in the high headroom building. This will provide both covered storage for the lumber as well as ample work ahead at the point of use. The work truck will also spot the individual packages right in front the conveyor system which feeds the boards to the ripsaw, then to the matcher operation.

From the latter, the boards travel over the system to a trim saw, which trims out defects. The boards, all of uniform thickness and width though of different lengths, are then delivered to a sorting rack. After measuring, an operator places the individual pieces according to length in the boxes of the rack. Ten assorted boards are then tied into a bundle which is sent on a belt conveyor to the shipping department. Incidentally, the usuable waste from these boards is routed via an overhead conveyor to another department, where many small accessories

(Turn to page 59)

OBSOLETE HANDLING *is costly*

CONTROLLED MATERIALS PLACEMENT

• saves time and floor space
• eliminates duplicate handling

● *The worst handicap that production suffers—the loss of time spent in picking up and handling tote pans, due to not controlling work placement at point of operation.*

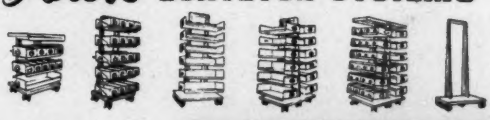
● *There are definite advantages through controlled placement of parts in the Master Trays on the Rack Conveyor. No time lost sorting and locating parts: everything accessible.*

WITH Rack Conveyor Systems you bring order out of chaos, help speed assembly or machining and save operators time. The usable vertical space provided by the Rack method affords as much as six times the working capacity for every square foot of floor space occupied.

Write for information on Rack Conveyors for your particular shop procedure, whether for handling, moving or processing.

Over 300 Leading Manufacturers Use

Rack CONVEYOR SYSTEMS



6 of the 18 Rack Units Available

RACK ENGINEERING COMPANY
PITTSBURGH 1, PA. • DETROIT 2, MICH.

1-A

.....MAIL TODAY.....

RACK ENGINEERING COMPANY, Pittsburgh 1, Pa.

We are interested in discussing the application of the Rack Conveyor System to our factory operations.

Company ..... ***Name and Title*** .....

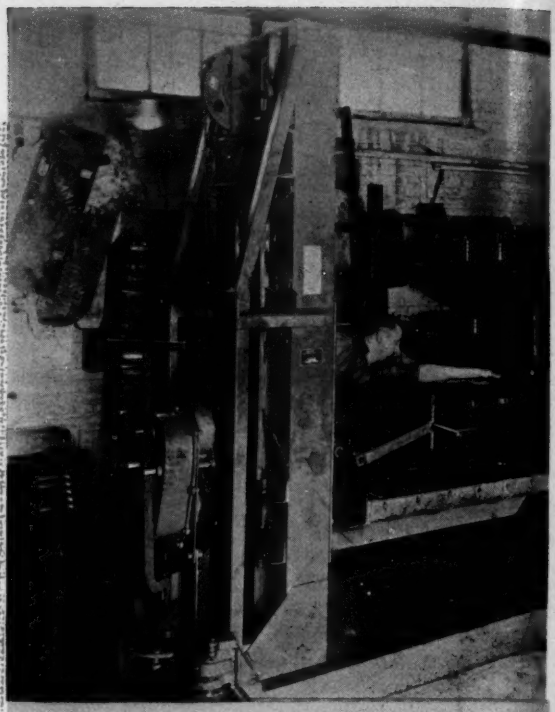
Address .....

Handy Handling

I.

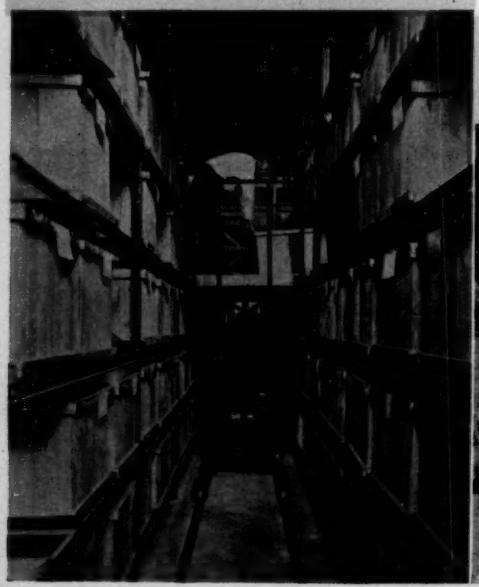
A large proportion of all materials is regularly moved and handled by means of time-saving and energy-saving manually operated equipment. Through receiving, processing, assembly, storage and shipping, standard and specialized "tools of handling" are performing a multitude of tasks economically, in plants large and small.

Photos on these pages, Courtesy Barrett-Cravens Co., Chicago.

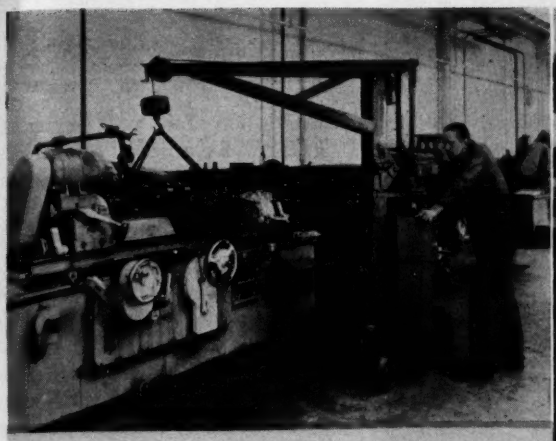


To facilitate the handling of dies, this portable elevator is equipped with a roller platform.

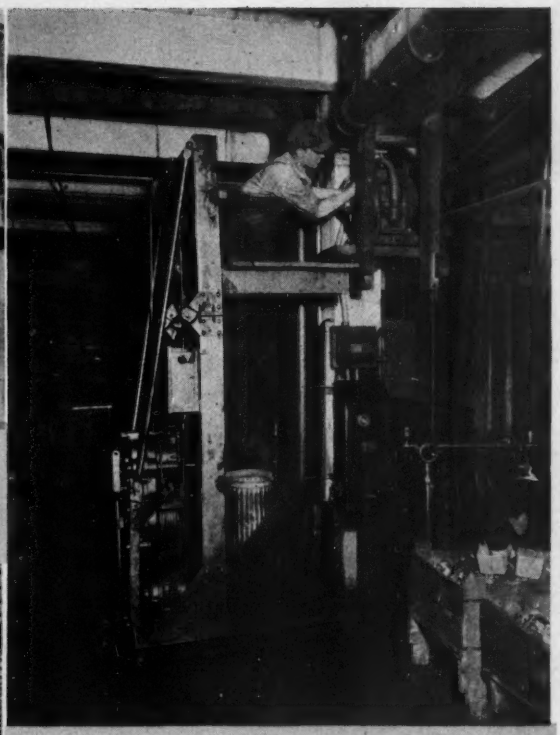
In this stockroom, platform on tracks helps provide orderly housekeeping and material handling.



Much manually operated equipment is designed for special purposes. Shown is a cable reel truck.



This portable crane, with a revolving base, is facilitating an exacting task on a crankshaft.

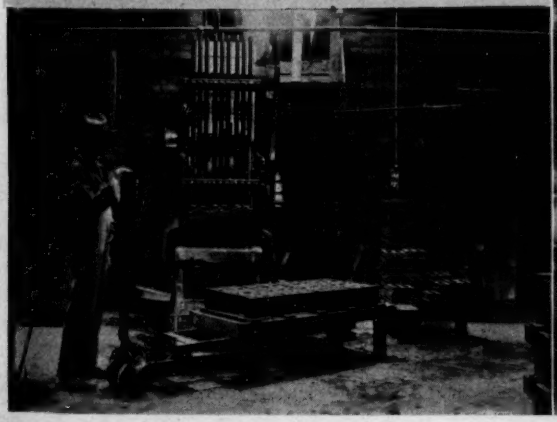


Moving up in the world—this maintenance man does it on a solid platform, photo above.

Bulky and odd-shaped articles (crates of veneer) are upended by portable elevator, photo at left.

Thousands of barrels of whisky are racked and deracked by portable elevator, as shown below.

These concrete blocks are safely moved on short hauls by the spring-frame hand lift truck shown.



Engineering

IS OUR BUSINESS

YOU don't buy conveyors by the pound—nor by the piece. You buy equipment which, when installed, is an integrated, workable plan for moving parts or products through successive plant stages. And the heart and core of this plan is *engineering.* Economies in time, effort and space are reaped in direct proportion to the skill and care exercised on the drafting board. Logan, a conveyor pioneer, with two generations of experience, has justifiable confidence in its staff of engineers. At the home plant, and in the field as well, Logan Co. offers grade-A talent to serve a host of nationally-known customers.

In the above Logan conveyor installation, ball plate tables facilitate transfer of work in process from feeder line operations to main assembly line.

LOGAN CO., Inc., 558 Cabel St., Louisville 6, Ky.

Preserve FREE ENTERPRISE It Built a Nation

Logan Conveyors

PUT *FLOW* INTO PRODUCTION

LETTERS TO FLOW . . .
(Continued from page 4)

subscription for your magazine "FLOW," for a period of one year. Enclosed you will please find my check for $2.00 to cover.

Referring to your December issue, page 12, you show an illustration of a Space Saver Steel Rack in which we are particularly interested. We would like all possible information with regard to its construction; that is, what is the material of which it is built, what are the sizes of the sections, whether of wood or steel, at what angle the rack is set and how is the steel loaded into the different sections and how removed. All possible information along these lines will be greatly appreciated.—T. J. Dillon, President, Mapes & Sprowl Steel Co., Union, N. J.

Mr. Dillon received the details promptly. For the information of other readers, a similar rack was shown in the November issue, page 58.—Ed.

SHORT FEATURES IN APRIL

FLOW for April will include a number of special short articles, covering a variety of products and handling methods.

Included among these will be one dealing with the method used by a manufacturer in bracing barrels and pails—a method that has greatly reduced damage loss and claims. Another covers the handling of lead pigs, a third the use of pallets in a refrigerator assembly line, a fourth the handling of bulk materials in several yard operations. Look for these short features in the April issue of FLOW.

To FLOW
From Cover to Cover

We have been receiving FLOW for the last several months and we highly recommend your publication. It fits in our program . . . much better than any other magazine I have ever read. I have studied each issue from cover to cover. —Glenn P. Grissman, Glenn P. Grissman, Co., Detroit, Mich.

To FLOW:
Unit Loads

Having been informed that you

publish FLOW magazine, which deals with the handling of material in warehouse and also in unit loads, I shall appreciate your entering my subscription. My personal check in the amount of $2 is enclosed.

If you have available for distribution any literature covering the unit load method of shipping merchandise in freight cars, I shall appreciate your furnishing it. Perhaps you can refer me to other firms, industries or associations that have made a study of the subject and have printed material on the subject.—E. M. Musselwhite, Special Agent, Traffic Department, The Pennsylvania Railroad, Philadelphia, Pa.

Reader Musselwhite has been referred to several publications which may be of help. Two are mentioned in the Off the Shipping Platform department, this issue. —Ed.

To FLOW:
"A Help"

Your October issue of FLOW magazine was brought to my attention recently. I think it is a fine asset to any person engaged in the field of industrial engineering, especially a help in keeping current with all the latest improvements on material handling problems . . .

On pages 61 and 62 of the October, 1945, issue you announce 29 free booklets concerning many and varied problems encountered in industry. The information covered in these bulletins is of particular interest to me, as I am employed with a large manufacturing corporation as a senior methods engineer. I would appreciate very much your sending me these 29 bulletins, also a subscription blank for FLOW magazine.—R. A. Canby, Lansing, Mich.

To FLOW:
Glued Loads

In your October issue of FLOW, page 27, a very interesting article was written on glued loads, used by the Quartermaster Corps, that have proved very satisfactory. If possible, we would like to obtain the vendor's address so that we might obtain some of this material.

Also attached is a request for free literature on items checked.—W. F. Henderson, Manager, Material Handling Department, United States Rubber Co., Winnsboro, S. C.

Several companies make the product mentioned by Reader Henderson, and their names have been sent him.—Ed.

To FLOW:
FLOW Meets Public

We are a subscriber to your magazine, and take pride in the fact that it helps us in our work. When the various personnel finish reading each issue, we place it in our reception office where the various callers may read it while waiting a few minutes for their appointments.

We would appreciate knowing if you have a leather binder . . . in which to keep the monthly issues on our desk in the reception room. We take a great deal of pride in this room and would like to have the cover for your magazine.—C. Sachs, Joseph Behr & Sons, Rockford, Ill.

Covers may be available later. —Ed.

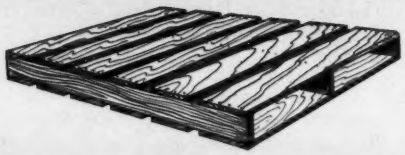
WHICH GIVES GREATER PROTECTION-

Size and thickness do not determine strength. Much depends on type and quality of materials, and skill in construction.

SUPERSTRONG boxes and crates—"Bound with Steel" —have less weight and occupy less valuable space, yet have all the strength to stand up under the toughest shipping conditions. They really give you protection . . . plus!

SHIPPING SUPERSTRONG CONTAINERS

RATHBORNE, HAIR AND RIDGWAY COMPANY
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

ON THE  PALLET

NEWS · VIEWS · TRENDS

"IF THE demand from industries of a shorter working week, and at the same time increased production is to be attained, there will be a very great demand for suitable mechanical handling methods and appliances.

"Certain industries are today becoming 'mechanical handling minded' but others are lagging sadly behind. Many operations in certain factories at the present time are still being done by old manual methods. This is a new age and demands, as we have said, a new approach to old problems if we are to reach the goal that we have promised ourselves for so many years."

From—"Mechanical Handling"—London, England.

$$Z = \frac{(S+T+U-E)X : Y = (A+B+C+D) : V = ((S+T+U-E)X) - Y}{A+B+C+D}$$

SOUNDS like a lot of gibberish, of course, but the above are formulae which have been evolved by the Material Handling Division of the American Society of Mechanical Engineers for computing economies derived from using labor saving equipment. They are based on the cost of the old method of using little or no equipment, compared with the cost when using proper modern equipment.

Articles in future issues of this magazine will give you the inside on these basic cost estimating factors.

A JOINT meeting of the Material Handling Society, the Traffic Men's Association, the Shippers' Council and several other organizations in Pittsburgh March 18, will be the 1946 inaugural of the annual "Perfect Shipping Month."

The meeting will be a symposium on handling methods in transportation to eliminate losses. Representatives of the railroad, trucking and aircraft industries will tell how proper packing, handling, palletization, unit loading, etc. can be of benefit to shippers in lowering freight costs and cutting down on damage to shipments.

The Society recently elected as its president T. O. English of the Aluminum Company of America.

IN A recent article in the Iron and Steel Daily News the importance of proper sling chain material as a safety precaution was emphasized. Some of the new chains are coming through in low carbon nickel and molydenum steel which, when heat treated, has a tensile strength of 125,000 psi.

Typically American is the culmination of tests made on this new type of chain material. Because of its extra strength, a size smaller than that of the ordinary iron chain can be used, and the price differential is not too excessive.

ACCORDING to the Electric Manufacturers' Public Infromation Center, efficiency in packaging fluorescent lamps for shipment now is responsible for saving 1,500,000 feet of tape and 2,500,000 sq. ft. of boxboard a year. It is done simply enough by using cartons that open at the end instead of at the side.

HAVE you ever thought of the problem of shuttling planes between hangars and flight decks on big carriers? When you look at a picture of a carrier in action, it is pretty obvious that split-second timing of crews, pilots and the ship is essential.

In the old-type carrier, as soon as the midship elevator carrying airplanes left the flight deck for the hangars below, there was a large hole in the middle of the deck and during this time planes could neither take off nor land. The possibility of the elevator being badly damaged while in the downward position was a nightmare for the flight officers.

The solution devised by Westinghouse engineers was to hang the elevator over the side of the ship. This deck-edge elevator was a platform 60 feet long by 34 feet wide—a thousand people can stand on such an area. Counterweighting was not possible. To further complicate the problem the platform and supporting structure had to be collapsible against the side of the ship when not in service and to enable the ship to pass through the Panama Canal. Hydraulic drives were created which provided both energy storage and partial recovery systems by which the peak loads on the aircraft carriers' electrical plant were reduced by nearly three-fourths.

A hydraulic ram nestles horizontally just inside the hull for this type of installation. The ram, incidentally, is a cylinder and piston some two feet in diameter and 14 feet long.

PACKAGING'S vital role in industry and its importance in our commerce and progress, will be comprehensively visualized during four active Spring days at Atlantic City, N. J. Known officially as the Packaging Exposition of 1946, it will be staged April 2nd to 5th and sponsored by the American Management Association.

A NEW featherweight construction material—a "honeycomb" of cloth or paper sandwiched be-

(Turn to page 63)

XUM

THAT'S ACME *Uni-Pak*...

The modern method of shipping and handling a group of packages, semi-finished parts, or finished products . . . made possible by Acme Steelstrap.

Alone or in combination with a skid or pallet, Acme Steelstrap converts individual packages into one unit.

Note the photo above. Twelve brake drums per crate all secured with Acme Steelstrap. In short, one package doing the work of a dozen, and "bound to get there."

Enjoy important savings in time and handling costs, plus hearty "thanks" from the customer end of your shipping line . . . Use Acme Uni-Pak for handling and shipping your products.

Acme Uni-Pak Loads 10 Tons More in Single Car

A shipper of cable reels said . . . "we kept close tab on one of our carload shipments using Acme Uni-Pak. We netted a total savings in dollars and cents of $81.64 over old methods . . . plus, 20,000 pounds additional cargo loaded in the car . . ."

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

ACME STEEL COMPANY

ACME STEEL CO. CHICAGO

"CRYSTAL" CLEAR HANDLING...

(Continued from page 22)

devices designed to eliminate breakdowns, which would interfere with the movement of the millions of pounds produced daily.

To assure a smooth, continuous operation, electric trucks are brought in for a "pick-up" charge every noon. The temperature of the individual battery is noted and a check is made again after charging. A safeguard is thus provided against a temperature of 115° or above, which would warp the battery plates and cause their coating to drop to the bottom. If a truck comes in with its battery registering 112° or less, it is put at once in the charging line. This is made possible by a special air cooling installation.

Mechanically Speaking

The slinger or carloader is a portable hopper mounted on two wheels, which has two supporting legs on one end. At the bottom of the hopper is an endless belt which is operated over pulleys by an electric motor-driven unit. The belt is suspended in a slack position thus creating a depression or pocket between the pulleys. Salt falling into this pocket is carried forward by the moving belt whose rapid motion throws it up in a pile at the discharge end.

Above the charging line is a duct which conveys cold air, and from the duct hang sections of flexible tubing. The cold air is blown on the battery while charging, and so prevents the temperature of the battery from rising while receiving the charge. As an example, a truck came in with its battery registering 90°, 1,200 gravity. It was built up to 1250 gravity, and went out at 89. As a result of this installation, the batteries are kept up to par and the company's trucks constantly operate at efficient speeds. Records kept show that the life of batteries has been increased by 15% by cooling them while charging.

A device for accurately checking on the running time of the electric trucks is a so-called "service recorder," which registers when the truck is running. Through vibration, a needle marks a circular paper chart, which indicates the running time. The chart is removed every day and the running time entered on a control sheet. When the total running time reaches a given limit, the particular truck is greased and oiled. This care and regular check on material handling equipment gives Diamond Crystal the necessary insurance against internal transportation breakdowns.

Truck receiving its "pick-up" charge at noon. Note flexible hoses extending from system.

"SHELF-MADE" SOLUTION...

(Continued from page 24)

also simplified and speeded by various procedures. In the office, the items on each order are written up in numerical sequence and the part numbers on the packaged stock shelves likewise run in sequence. Thus a stock clerk seeing that a particular order starts with No. 63, for example, is enabled to spot her shelf truck accordingly. Consequently, she can obtain her orders with a minimum amount of walking.

Another feature is the order blank that is used by the company. This is a ditto form, of which seven copies (also shipping labels) are run off in a jiffy, a rapid reproduction process that saves typing and so speeds the office procedure. The seven copies are used by the several divisions (sales, production, order filling, etc.) for billing and various record purposes. The seven copies consist both of "long" and "short" forms. The long ones have an extension for prices; the short parts, without this extension, are used where price information is not concerned (as in order picking.)

The order clerks assemble the orders on the type of shelf truck shown in one of the photos. This model is somewhat larger than the supply trucks used for moving the packaged stock to the shelves. The height is approximately 51", length 48", and the width of the shelves 20". The ample shelf space permits the operator to assemble several orders in one trip, thus again reducing the amount of walking.

Packing and Shipping

The loaded shelf trucks are delivered to packing stations which are arranged parallel to a roller conveyor line. Each station is equipped with a table and a (somewhat lower) bench. Empty knock-down cartons are conveniently placed on a shelf under the table. The items are first checked on the table against the order and then packed in the corrugated containers. When a container has been filled, the packer simply slides it off on the roller conveyor. Since both the bench and the conveyor are on the same level, any lifting is made unnecessary. (The small parts usually consist of brass, and therefore the avoidance of lifting is an important consideration.)

Just beyond the packing stations, the shipping containers move onto a weighing scale, where the routing operator is stationed. She records the weights and routes the packages according to shipping carrier. (Note: The larger and heavier boxes of "industrial" orders move over a conveyor line that parallels the one used for jobbing orders.) A few feet beyond the scale, the heavier cases (usually those weighing 50 pounds and over) are securely fastened with ½" steel strapping. At the end point, the various cases are segregated on skids according to destination and shipping carrier. From here they are moved by hand lift truck and elevator to the shipping room on the floor below.

This, briefly, is how Weatherhead jobbers receive the thousands of varieties of small parts. Avoiding confusion and delays, the operation is done with efficiency and dispatch, by means of adequate procedures and stockroom facilities.

CORRECTION—In the January article "Extra, Extra!", page 17, the unloading time for 3,000 tons should have read 18 hours, not eight.

Scheduling for "Fustes with the Mostes

"Git thar fustest with the mostest"—
Maj. General Nathan B. Forrest.

By BRIG. GEN. E. E. MacMORLAND, U. S. A.

Chief, Field Service, Office of Chief of Ordnance, Washington, D. C.

That job to be done; when; where; by whom; with what equipment—the meaning of scheduling as developed by the Ordnance Department of the U. S. Army. The methods described here apply to industries faced with the problem of re-establishing networks of foreign installations.

By Courtesy of Mechanical Engineering

WHEN an Ordnance depot operator refers to scheduling, he means the daily development of a formalized plan for the performance of work at the right time, at the right place, in the proper sequence, and using that method which will result in the least expenditure of manpower per unit of production. His approach to the carrying out of the scheduling operation is strictly conventional, i.e., he first determines what work must be done and when it should be completed; then he decides where the operation should be carried on, and by what person or persons, method, and equipment.

Depot operators have not always used the standardized scheduling procedure described in this paper. Early in the war, when depots were first placed in operation and staffed by personnel brought from all types of industries and positions, the work to done was so new that necessary elements for daily scheduling were not immediately available. Particularly, information was lacking as to the best method for the performance of any particular job. It was not an unusual condition to find in one day, at one installation, the unloading of 75-mm projectiles from railroad cars into igloos being performed by five different crews using as many various methods. Moreover, the newness of the organization, with lack of time available to develop interdepartmental cooperation, resulted in lack of information as to just what work should be done each day.

The Jobs to Be Done

Ordnance divides its scheduling into four phases: A listing must be made of the work to be performed. This includes not only that which must be done during the immediate period for which work assignments are being made (usually 24 hours) but all other outstanding work projects as well. Such a listing insures that no job is inadvertently overlooked and that the person doing the scheduling takes maximum advantage of saving through job combinations.

The work to be performed in the storage activities at an Ordnance depot falls into three categories: The depot commander must see that shipments are made to the using forces in conformity with requisitions placed upon him. This may mean the removal from storage and placing 1, 10, or 50 identical carloads of such an item as 250-lb bombs in box cars, or it may involve the selection of small quantities of spark plugs, piston rings, and bearings from bin stock and packing them for delivery by parcel post. By far the greatest tonnage is removed by carload lots.

The commanding officer must also make adequate provisions to unload, sort, if necessary, and place in stock new material being received from manufacturres or items being returned from the using troops.

The third category of work is referred to as "backlog" or "rainy-day projects." It includes those miscellaneous activities essential to the operation of a storage depot, but usually having no date on which they must be completed. An example of this type of work is the rewarehousing and consolidation of small tag-end lots of items in order to consolidate scattered vacant space. It is also possible that some material in storage has been declared obsolete and there is a job of removal from storage, disassembly, and disposal through salvage channels. In the case of a depot handling ammunition, it may be that using troops call for items in a different type of package than

BACKLOG WORK PROJECTS INVENTORY DATE.....

Activity	Item or Description	Quantity on Hand Completed	Quantity to be Done	Man Days Required	Priority	Remarks
Package for overseas	Rocket Launchers	12,042	72,864	2,478	3-1	
Boostering Bombs	1000 # Bombs	8,270	32,470	6,720	3-1	
Rewarehousing	Gen. Supplies	.....	180,000	1,200	3-2	To make available potential space
Salvage	Metal and Lumber	.....	.....	15,000	3-3	To be done as workload permits
			TOTAL	25,398		

Figure 1—Backlog Work Projects Inventory.

that in which the material is then stored. Accordingly, when receiving and shipping activity is light, personnel must be set to the task of repackaging.

Of the three categories of work, it has been found that most care need be taken in the case of backlog projects to insure that adequate information is available for scheduling purposes. There was frequently a tendency on the part of operating personnel not to formalize such work, but merely to carry in their heads that "such-and-such a job" must be done "at some time in the future." To overcome this difficulty, a "backlog work projects inventory," Fig. 1, was developed. Field supervisors are directed to forward to the office of the storage officer, where this record is maintained, information concerning proposed backlog work. This will be particularly concerned with rewarehousing material in storage and reworking items requiring preservative action. The storage officer, on instructions received from his superiors, adds such projects as salvaging and repackaging. Each proposed project is listed on the register with information sufficient to describe the work to be performed and labor requirements necessary to complete the job. At a weekly supervisors' meeting, the storage officer discusses each outstanding project on the register and assigns a priority in order of urgency of performance. As projects are completed, or partially completed, appropriate adjustments to the inventory record are made.

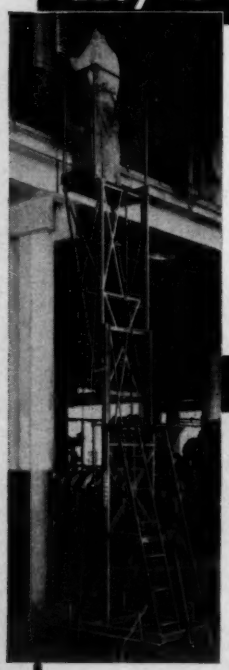
In order to insure that individual depots do not accumulate too large backlogs, or schedule performance of work not essential to efficient depot operations, copies of the inventory are forwarded to Washington for monthly review.

Assignment of Personnel and Equipment

The second phase of scheduling a depot's operations concerns itself with the assignment of personnel and equipment to the performance of work in order of priority. In doing this, the labor force at an installation is thought of in terms of a reservoir of potential energy; and in assignment of work, this reservoir is drawn upon first in sufficient volume to fill the needs for accomplishment of No. 1 priority jobs. When sufficient labor and equipment have been earmarked for the performance of this work, additional quantities are scheduled for No. 2 priority work. Sometimes there is not sufficient labor available to fill all No. 2 priority requirements. When this is the case, some projects must be carried over to the next day's schedule. On days when all of No. 2 requirements are filled, labor and equipment are directed to the performance of No. 3 priority work.

Because the function, for the performance of which depots were designed, is to supply troops in the field, the filling of shipping requisitions is assigned No. 1 priority. The unloading of incoming material and replenishment of stocks receive No. 2 priority classification, and the balance, or backlog proj-

Easy to Reach High Spots Safely



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Designed for safety in maintenance of lighting fixtures, ceilings, skylights, overhead cranes, etc. Hand operated. Ladder steps to platform when elevated. Equipped with floor lock. All models have minimum height clearance, when down, of 6 ft. 8 in.

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No. 2, Platform lift 11 ft. 9 in..... 260.00
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SHOPLIFTER

One man can handle heavy dies up to 500 lbs. alone. Easily moved about. Also handy for loading and unloading trucks and miscellaneous lifting jobs. Platform 24 in. x 24 in. Lift of platform 4 ft. 6 in. Price $147.50 (foot operated floor lock optional, $10.00 extra). Prompt delivery — Heavier capacities available.

ECONOMY ENGINEERING CO.

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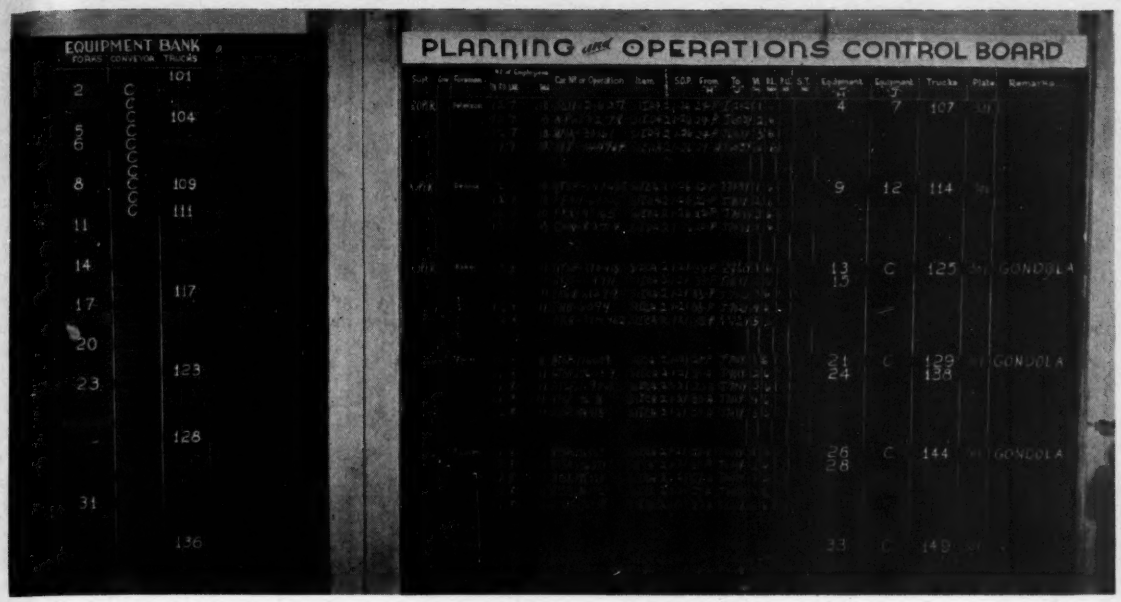

Figure 2—Daily Work Plan (Master Assignment Schedule).

ects, are classified as No. 3 priority. Within any one of these categories, of course, a further breakdown of classifications is sometimes made. For backlog projects, this has already been discussed. In the case of shipments, the filling of an emergency requisition, resulting from battle shortage, would receive all possible expediting. An example of this occurred during the Battle of Tunisia when, in the midst of the fight, it was found that a particular fuze was required in quantities exceeding those listed in original requirements. A radio requisition from General Eisenhower to Washington resulted in the air shipment of required fuzes from a southern depot and their use against the enemy less than 48 hrs. after the North African forces placed their radio requisition. Likewise, incoming material that has run into demurrage, because all available labor has been concentrated on handling emergency shipments, receives a higher priority for unloading than railroad cars that have just arrived on the depot.

Master Assignment Schedule

The assignment of personnel and equipment involves two basic steps: A "master assignment schedule," or "daily work plan," must be set up to record scheduling decisions made. This may be done either on a paper form or a large wall-scheduling board as shown in Fig. 2. The setting up of this form includes listing, in order of priority, all outstanding work projects. Because this must include the completion of tasks started the previous day, information concerning the degree of completion of which will not be available until the end of the previous work period, the master schedule is usually set up at the end of the day preceding that for which work is being planned.

Standardization of Material Handling Methods

In order to complete the work schedule and show specifically that work which each foreman will perform, the labor and equipment he will use, and the work processes he will follow, it is necessary that the proper work method be determined for the performance of each job listed.

It has been pointed out that, early in the war, many methods were in use at a single depot for the performance of identical tasks. The choice of the work method was then largely dependent on the past experience or ingenuity of the foreman concerned and the type of material handling equipment if any, he was able to assemble for his crew. The first step taken by the Ordnance Department to rectify this condition was to design and standardize a range of fork-lift trucks and warehouse tractors for use in material handling operations and to place contracts in such quantities as to insure an adequate supply of this equipment for the average load to be handled at each installation. Recognizing that greatest immediate savings in labor expenditure could be made by developing adequate daily work scheduling, and that this would be delayed if it were withheld until standard procedures for the performance of each operation could be developed by a central agency and distributed for use in all field installations, steps were taken to assist each depot in developing its own standard material handling procedures.

Regional training conferences were held at which Washington methods men discussed with depot personnel those problems involved in the design and utilization of standard procedures. From these conferences, a standard production data sheet was developed. The use of this form will be discussed in a later article. It is pointed out here, however, that it furnished a device whereby depot personnel could record production results for each of the various methods used to perform a single job. Analysis of these sheets permitted determination of that method and gang make-up which consistently resulted in the lowest labor cost per unit of production obtained. In so far as handling equipment was available, the

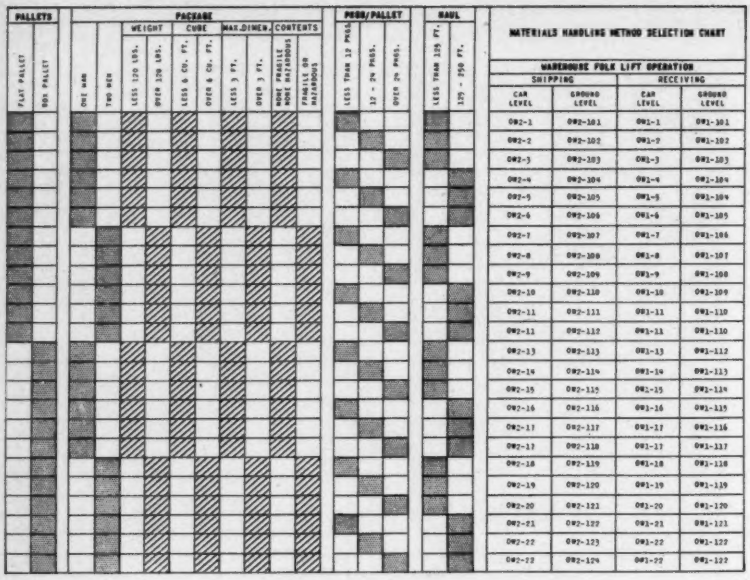

Figure 3—Method Selection Chart.

depot then standardized upon this method and crew size and used information obtained from the study for daily scheduling.

Over a period of time, depot staff personnel in the Office, Chief of Ordnance, obtained copies of standard operating procedures established by the depots. From this information they determined the most effective method for the performance of a particular job and added it to the growing list of standard operating procedures prescribed for use at all installations.

Addition of a new procedure is now optional for use at the depots for the first three months succeeding its publication. During that time depots are urged to submit information concerning any methods they have recently developed, believed to be superior to that prescribed by the central office. At the end of the 90-day period, the standardized procedure is republished in a form incorporating depot suggestions and is then mandatory for use at all Ordnance installations. It should be noted, however, that when an installation can develop and demonstrate an improved method, standard procedures are revised accordingly.

In this manner, without the use of a pilot installation, standardized material handling operating procedures have been developed. All operations have not as yet been covered but it is anticipated that standard procedures will be prescribed completely by middle 1946. Procedures published by the Office, Chief of Ordnance, prescribe personnel, equipment, and layout for the receiving or shipping of any particular item or group of similarly packed items. Classification of these procedures is predicated on the conditions under which the work must be performed and the type of handling unit, without regard to the contents of the handling unit. Exception is made to this only when the contents of a package may be of a hazardous or fragile nature, such as explosives for shipment overseas or acids for domestic distribution.

Where an Ordnance-specified standard operating procedure exists, scheduling personnel need only turn to the file of procedures to determine personnel and equipment requirements for the performance of any specific job listed on the "master assignment schedule."

Where an Ordnance-standard procedure does not exist, a depot-standard procedure will be used. In this case, the person doing the scheduling may use the locally developed technique for the selection of the proper method. One depot has reduced the solution of this problem to a method-selection chart, illustrated in Fig. 3. This chart is designed to facilitate the section of the method of handling palletized material into, or out of, warehouses, and considers the following four basic factors:

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It's speedy, lightweight and versatile . . . . the Tote-All Conveyor, the modern fast way to handle bulk material up to 14" top size, such as sand, gravel, coal, brick, salt, etc., etc.

Demountable gasoline or electric power unit optional . . . 14 ft. and 20 ft. lengths . . . flanged sides or sliding hopper to meet your requirements . . . Trail hoist, combination trailer and hydraulic lifting device adds to versatility of the Tote-All.

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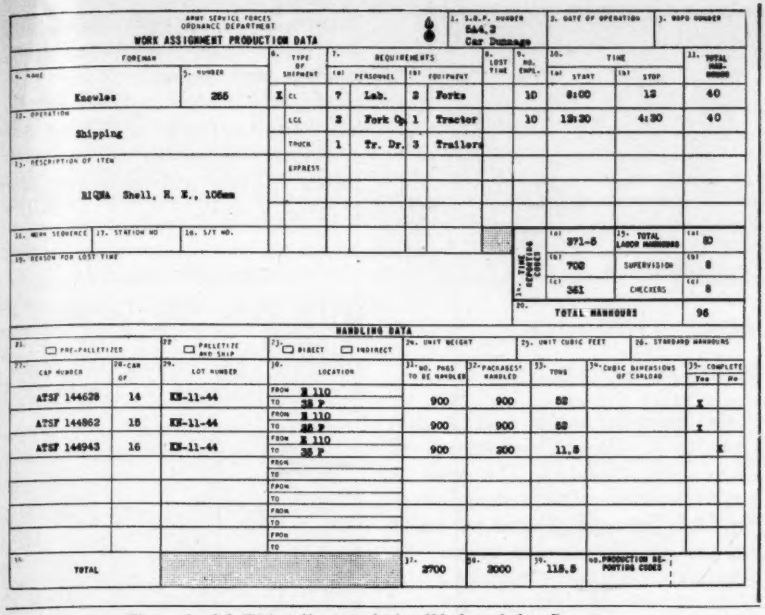


ARMY SERVICE FORCES
ORDNANCE DEPARTMENT
WORK ASSIGNMENT PRODUCTION DATA

1. S.O.P. NUMBER 544.2 Car Damage
2. DATE OF OPERATION
3. WPD NUMBER

4. FOREMAN NAME	5. NUMBER	6. TYPE OF SHIPMENT	7. REQUIREMENTS: QTY PERSONNEL	QTY EQUIPMENT	8. LOST TIME	9. NO. EMPL.	10. TIME: START	STOP	11. TOTAL MAN-HOURS
Knowles	265	X CL	7 Lab.	2 Forks		10	8:00	12	40
		LCL	2 Fork Op	1 Tractor		10	12:30	4:30	40
		TRUCK	1 Tr. Dr.	3 Trailers					
		EXPRESS							

12. OPERATION: Shipping
13. DESCRIPTION OF ITEM: 81MM Shell, H. E., 105mm
14. WORK SEQUENCE 17. STATION NO 16. S/T NO.

15. REASON FOR LOST TIME

18. TIME ANALYSIS CODES		QTY	21. TOTAL LABOR MANHOURS	QTY
		272-8		80
		708	SUPERVISION	8
		361	CHECKERS	8
	20.		TOTAL MANHOURS	96

HANDLING DATA

22. ☐ PRE-PALLETIZED	23. ☐ PALLETIZE AND SHIP	24. ☐ DIRECT ☐ INDIRECT	26. UNIT WEIGHT	25. UNIT CUBIC FEET	26. STANDARD MANHOURS

27. CAR NUMBER	28. CAR OF	29. LOT NUMBER	30. LOCATION	31. NO. PKGS TO BE HANDLED	32. PACKAGES HANDLED	33. TONS	34. CUBIC DIMENSIONS OF CARLOAD	35. COMPLETE Yes	No
ATSF 144628	14	KS-11-44	FROM R 110 TO 38 P	900	900	82		X	
ATSF 144862	15	KS-11-44	FROM R 110 TO 38 P	900	900	82		X	
ATSF 144943	16	KS-11-44	FROM R 110 TO 38 P	900	200	11.8			X
			FROM TO						
			FROM TO						
			FROM TO						
			FROM TO						
36. TOTAL				37. 2700	38. 2000	39. 115.8	40. PRODUCTION REPORTING CODES		

Figure 4—Job Ticket Used to Assign Work to Labor Foreman.

1. *Pallet Factor.* Provision for flat pallets, if rectangular or otherwise easily stacked handling units are involved, or a box pallet where round or irregularly shaped units are concerned.

2. *Package Factor.* Determination of whether one or two men will be required to load or unload the handling units onto, or off, the pallet. If the individual handling unit exceeds 120 lbs., has a maximum dimension of more than 3 ft., or exceeds 6 cu. ft. in volume, the chart indicates that two men will be required. Otherwise, only one man is necessary. In case of hazardous or fragile material, two men would be employed even before the specified weight, dimensional, or volume limits are reached.

3. *Packages per Pallet Factor.* Provision is made for use of different procedures for pallets holding less than 12, 12 to 24, or more than 24 packages.

4. *Length-of-Haul Factor.* Provision is made for use of different procedures for hauls between handling points less than 125 ft. and 125 to 250 ft. distant.

Scheduling personnel use the method-selection chart as follows:

1. Based on knowledge of handling units concerned, select the indicated portion of the pallet-factor column dependent on whether flat or boxed pallets will be used.

2. Check the weight,, cube, maximum dimension, and hazardousness or fragility of the handling unit against limitations set for each of these items and determine therefrom whether the handling unit is a one-man or two-man package.

3. Based on standard storage diagrams, select the indicated column under heading "packages per pallet."

4. Based on knowledge of where the item will be handled select the indicated column under the heading "length of haul."

5. Only one horizontal line may be drawn through the solid portion of the four factor columns selected on this chart. Following this line to the right of the chart will indicate the code number of the proper depot-standard operating procedure.

Reference to the method-selection chart, Fig. 3, indicates that, if boxes or rifles were being received for storage on flat pallets and each box weighed less than 120 lbs., contained less than 6 cu. ft., was 5 ft. long, packed so as to be nonfragile, and was to be placed in storage at a point less than 125 ft. from the receiving dock, Standard Operating Procedure OW1-7 would be used at a car level warehouse and OW1-106 would be used at a ground-level warehouse.

The scheduling clerk may be confronted with the problem of having no standard operating procedure, either Ordnance or depot-prescribed, available for use. Under existing conditions, this will rarely occur on receiving or shipping activities but will be primarily limited to a portion of the backlog projects. Accordingly, it is necessary that the scheduling clerk insure that the backlog work projects inventory is carefully annotated by supervisors as to personnel and equipment requirements and estimated time for the performance of those jobs not covered by standard operating procedures.

Listing Requirements

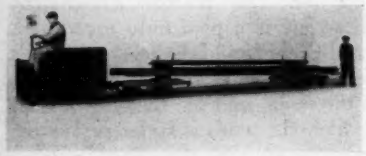
When scheduling personnel have selected standard operating procedures for each of the jobs listed on the "master assignment schedule," it is necessary to make appropriate entries on a job ticket or work assignment production data card, illustrated in Fig. 4. At this stage, information already appearing on the master assignment schedule is copied onto each card, and there is added thereto a listing of equipment and personnel required as well as the location at which the work is to be performed and the amount of work to be done. This information is likewise posted to appropriate columns in the master assignment schedule. With this information available, it is then possible to enter the appropriate foreman's name against those jobs for which he will be responsible. In so doing, it is necessary for the scheduling clerk to convert standard time expended, from man-hours per production unit for each standard operating procedure, to crew hours required for the performance of the volume of work to be performed on each operation, so as to determine the approximate time the given job will be completed.

Assignment of jobs to individual foremen is dependent on locations where the work must be performed and the known ability of certain crews to excel in particular types of work. It is common practice to assign to a particular crew a volume of work known to be slightly greater than can be performed during the scheduled period, the purpose being not to attempt a stretch-out of personnel but, rather, to overcome the unconscious slowing down of work when a backlog is known to exist. This also provides substitute tasks to be done in the event that equipment breakdown or order cancellation requires a

(Turn to page 50)

SWIVEL BOLSTER

A SWIVEL Bolster for handling long loads of steel rods or beams, timber, or other materials has been developed by the Mercury Manufacturing Co. It consists of



two identical assemblies, each of which may be attached to a single caster steer trailer by inserting posts into side rack sockets. Supported by bolster assemblies, these cargoes may then be moved through narrow doorways and aisles and around corners, according to the company. The lead trailer is pulled by a tractor or other suitable power vehicle, and the rear trailer is guided manually.

POWERED HAND TRACTOR

THE Transtractor, a new electric-propelled hand tractor developed by Automatic Transportation Co., Chicago, has been designed for operations that require a small, but powerful and maneuverable "push-pull" type material mover. The company points out that finger-tip control enables one man to handle any size or type of load with facility. The unit is equipped with a heavy-duty bumper plate for pushing, and a coupler is available for towing operations. Standard equipment includes a battery capable of eight to ten hours' operation. A portable cabinet plug-in charging unit is also available.

FLOOR PLATE

IN THE applications of the Factory Service Company's Four-Way Floor Plate to a standard transport chassis, the floor plate is welded flush with the top of the chassis on the angles of the frame. It is reinforced on the underside by two heavy angles. The "non-skid" feature keeps metal parts from "walking" off easily when the transport is in motion, it is stated. The embossments are said to provide contact with hot materials, which allows some air space between them and the steel deck.

FORK TRUCK LOADING

A COMPACT, light-weight fork truck called the "Trucloader" is a newly developed product of Clark

Tructractor. Designed to lift, carry, stack and tier unit package loads weighing up to 1000 pounds and to operate within narrow limits, the Trucloader is specially designed for loading and unloading highway trucks and trailers, it is stated. It has a turning radius of 57". In the accompanying photo the unit is shown loading palletized units of sugar in a truck.

CARBOY TRUCK

THE Palmer-Shile Co. offers a carboy truck of all steel construction. For loading, the truck is rolled up against the carboy, and

the gripping yoke is dropped over the top, as illustrated. The truck handles are then pulled back and loading becomes automatic. When unloading, the truck is tipped forward and the gripping yoke released.

RAMP ELIMINATOR

THE Moto-Truc Co., Cleveland, has added a ramp eliminator to its present line of material handling

equipment. The platform is 46" by 72" with a capacity of 5000 lbs. on

the standard model and 12,000 lbs. on the heavy-duty type.

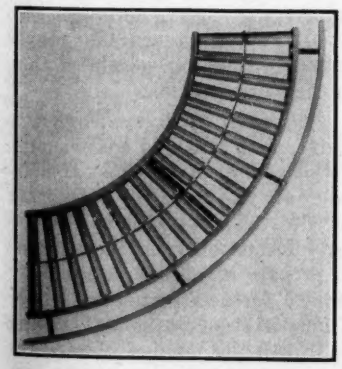
A finger-tip control is provided for raising and lowering the platform. This is accomplished by two hydraulic cylinders, one on either side, thus assuring level lifting of the platform. Special features include a protective device on each end of the ramp eliminator. This device closes the ends of the platform until the top level is reached, thus protecting the load under all operating conditions, according to the company. No sub-floor work is necessary to install the platform as it bolts directly to the floor.

ARTICULATED FORK TRUCK

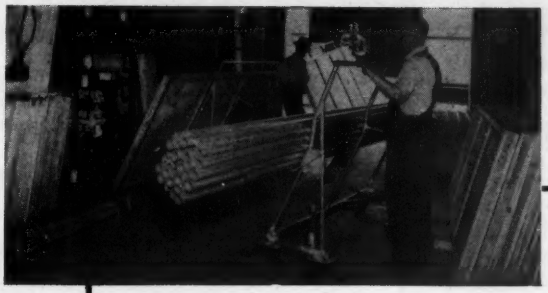
THE Baker Industrial Truck Division of the Baker-Rauland Co., Cleveland, has developed a new 4000 lb. capacity truck known as the Type AIMH articulated fork truck, which is designed primarily for warehouse operation. According to the company, the unit features a new method of steering by "articulating" the frame, permitting swinging the load to line it up in position without lining up the truck itself.

ROLLER CONVEYOR

LYONS Metal Products, Inc. is marketing a packaged line of gravity roller conveyors that can be used for the handling and transporting of cartons, bales, packages, boxes, crates and other types of



articles. The equipment is available in straight and 90° curved sections at 12", 18" and 24" widths. Trestles are available in 18" and 24" widths. Each item is a complete, packaged unit.



Handling Pipe and Flat Crates in a Metal Warehouse.

Specially Designed to Handle Long, Awkward Flat Loads

The ROL-AWAY enables one man to move long, flat material and pipe—with ease and safety—doing jobs ordinarily requiring three or four men. Ideal for flat metal plates, plywood, plate glass, pipe, tubing and large flat crated material. No lifting required to load or unload. Saves floor space—rolls in any direction—much faster than *any* other method. Capacity 2400 lbs.—weight only 64 pounds. Rol-away will save its low cost in a few days time. Get the facts on this time and labor saving truck, NOW.

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Not merely built, but

Engineered for Utmost Safety

● The very dangers which most often threaten life, limb and load simply don't happen when you use ACLC Safety Hoist Hooks.

Makeshift mousing gives place to automatic mousing. Snagging can't occur because no protruding point "asks" for it. Hook straightening and load slippage are avoided because the patented shoulders and lip LOCK the load in perfect alignment.

Time saved—men spared—cleaner jobs; hence more profit. Send for details Now!

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ACLC Safety Hoist Hooks are manufactured in three models—Eye Type, Shank Type, Shackle or Clevis Type.

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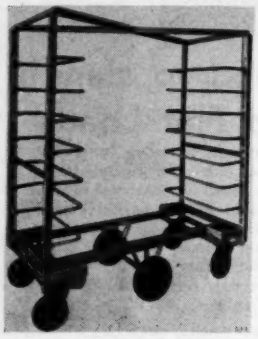
FLOOR TRUCKS

"Since 1886—for those who want the best!"



● Quality floor trucks for every materials handling purpose. Special trucks designed and built to meet your individual requirements. Without obligation, consult our Engineering Department.

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CON-VAY-IT *will do the job!*

Industries throughout the country are using CON-VAY-IT. Its use varies from the loading or unloading of sand to high speed handling of materials—metal parts, aggregate, chemicals, etc.—where cost and time are important factors. Four models: two belt widths—8 and 12 inch; two lengths—13 and 20 feet. For lifts too steep for a belt use FLIGHT-VEYOR.

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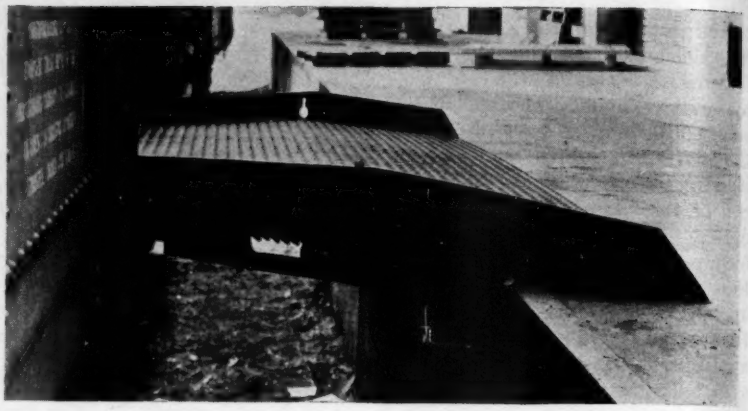
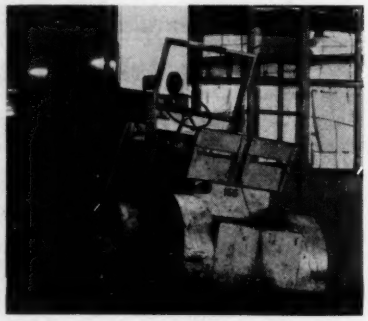
1117 W. Adams Street Chicago 7, Illinois
Please send full information on
☐ Flight-Veyor ☐ Con-Vay-It
Name.....
Address.....
City & State.....

ONE-MAN BRIDGE RAMP



The Pallet Engineering Co., San Francisco, Calif., announces a new-type bridge ramp. In addition to a positive adjustable lock to compensate for the different distance between box cars and docks, additional features claimed for this device are safety treads to prevent skidding, high side rails to prevent trucks overrunning the plate, one-man placement and removal, beveled edges to avoid cutting of tires, and crowning to compensate for different dock and car levels. The ramp is illustrated in its locked position between box car and dock.

HE LOOKED BACK — while he was driving ahead. The operator of this truck ignored a frequently repeated safety rule, and his carelessness resulted in an injury which laid him up for a number of days. The truck was also "laid up" for repairs, hampering production. "Look in the direction in which you are traveling" is a commonsense safety rule which should be heeded at all times by truck operators.



FUSTEST WITH THE MOSTEST ...
(Continued from page 47)

last-minute change of assignment, and in general overcomes variations between scheduled and actual performance rates.

When the master assignment schedule has been completed, it must be analyzed to insure that adequate equipment is available to fulfill the needs listed. In the event an over-allocation of equipment has been made, one of two steps may be taken: It may be possible to change the sequence of the performance of certain jobs; or it may be necessary to substitute a more costly method using less material handling equipment. If any changes are made in the schedule as a result of this last-minute analysis, corresponding changes must be made in the work assignment production data cards.

Getting Men and Equipment to the Job

The third phase of daily scheduling concerns the translation of the data appearing on the master assignment schedule into actions necessary to deliver personnel, material, and equipment in proper quantities and on scheduled time to the work location.

Equipment Delivery. Action to deliver materials and equipment is initiated immediately after completion of the master assignment schedule. This is done by extracting information from the schedule to prepare a railroad car spotting request for necessary work by the Transportation Section. The form sets forth the number of cars, the size, exact location, and time required for all movements during the succeeding 24 hours. A similar form is prepared for directing the delivery of material handling equipment.

Ordnance has recently added the

delivery of one more item to locations where ammunition shipments are being prepared, i.e., prefabricated dunnage. An outgoing carload of 250-lb. bombs requires the use of approximately 1000 fbm of dunnage. Early in the war, each shipping dock had its own small lumber yard where carpenters drew lumber and cut and fitted dunnage as the labor crew loaded ammunition into the car. Frequent stoppages resulted while the carpenters performed work necessary to the placing of the next layer of ammunition. Through standardization of dunnage specifications and insurance that material was loaded into specified size railroad cars, it has been possible to effect a large-scale prefabrication of dunnage and assembly of sets required for each type of ammunition and car size that might be used. The scheduling clerk orders the delivery to the loading point of appropriate sets of the prefabricated dunnage in the same manner that he requisitions the railroad car and material handling equipment.

The last job of the scheduling clerk, before he goes home late at night, is to check the execution of the work assignment production data card. When the foreman arrives in the morning, he will receive several of these cards describing the work assigned him for that day. It is necessary that each of these cards, Fig. 4, clearly sets forth information covering the following:

1. A description of the operation (space 12. 2. The sequence of performance of the jobs (space 16). 3. Personnel to be used (space 7a). 4. Equipment to be used (space 7a). 5. Procedure and dunnage (space 1). 6. Work location (space 30).

Personnel Delivery. Early depot operations, particularly in ammunition depots where the work point may be 3 or 4 miles from the time clock, frequently saw an hour pass from the time an employee punched his card until he picked up his first case of ammunition. Part of this was due to the fact that equipment was not available when he arrived at the work location. The other major factor resulting in this delay was caused by inability to instruct the foreman quickly in work to be performed so that he could assemble his crew, place them in a truck or bus, and proceed to the work point. Proper scheduling has permitted the correction of this condition. Personnel loading docks were constructed immediately adjacent to time houses and now, when employees arrive in the morning, they immediately report to their usual foreman, who directs them to the proper waiting truck. A small labor pool is maintained at the loading dock and immediately after the starting whistle, the foreman draws from the pool personnel necessary to fill his skeleton crew to the level indicated on that day's work assignment production data cards. Trucks leave the loading dock within two or three minutes after starting time, and late workers are assigned to the labor pool for that day. (This is from their point of view an undesirable assignment.) Hand tools are issued at the loading dock and, in many cases, hot coffee and sandwiches are available for workers who have had a long trip from home.

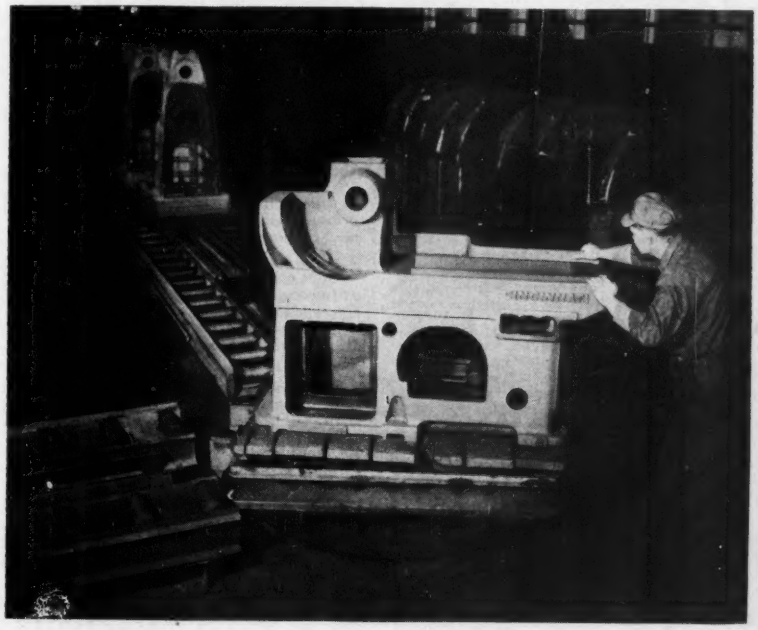
Reports of Accomplishment

The last phase of Ordnance scheduling is the obtaining of a record from each foreman of the work his crew performed during the day. This is done by having the foreman enter certain data on each of his work assignment production data cards, Fig. 4, prior to turning them in on the way home.

In order to appraise the results and furnish data for general operating reports, the foreman indicates in space 9 the number of persons actually used in a crew and, in space 10, total elapsed time. This permits clerical personnel to obtain total man-hours used in the performance of the work. The foreman

CONVENIENT SWITCH FOR CASTINGS

HERE is how castings are transferred from one roller conveyor line to another by means of a turntable. Air-operated pusher dogs in the center of the conveyor transport the units through spraying, drying and cleaning operations. The pallet serves as a carrying medium and makes possible the routing of large and small units of various shapes over the same conveyor line. After the transfer illustrated here, the casting rides onto a scale where it is removed by crane to a nearby flat car for shipment.—Courtesy, Cincinnati Milling Co.



ABC statement of Material Handling Facts

for busy manufacturers with an eye on the shrinking spread between labor costs and price ceilings . . .

Most management men in industry are aware of the many advantages of mechanizing handling of material in plant and warehouse. The basic facts outlined below deserve the consideration of any executive concerned with this problem.

A THE CASE FOR POWER INDUSTRIAL TRUCKS

1. **They conserve manpower.** One operator with a power truck can do the work of 6-10 men with hand trucks.

2. **They conserve time.** Besides speeding transportation of material, they load and unload cars faster, and save time on many other handling operations.

3. **They conserve space.** Fork trucks, Hy-Lift trucks, and crane trucks can tier material to make floor space more valuable.

4. **They promote safety** by eliminating the strained backs, hernias, crushed fingers or toes and other accidents resulting from manual lifting.

5. **They speed production.** By keeping materials moving, bringing work right to machines, keeping aisles clear, fast changing of dies, they reduce idle machine time and step up production schedules.

6. **They are flexible.** Not limited by craneways or tracks, they can operate anywhere —indoors and out—wherever needed.

B THE CASE FOR ELECTRIC POWER INDUSTRIAL TRUCKS

1. **Continuous Operation.** Always dependable—always on the job, electric trucks are built for long, hard service. Changing batteries takes less time than changing oil or re-fueling non-electric trucks.

2. **Lowest Maintenance Cost.** Case histories show that with proper care, Baker Trucks can cost their owners as little as $50 per year for maintenance and repair.

3. **Lowest Operating Cost.** Electric power is the cheapest power available for heavy duty industrial truck operation — even with cost of battery depreciation.

4. **Lowest Investment Cost** —when amortized over their many years of useful service. Most electric trucks are still going strong after 15 to 20 years of strenuous service.

5. **Maximum Safety.** Electric power is *safe* power — free from excessive heat, noxious fumes, and dangers of explosion or fire.

6. **Most Efficient Performance.** Smooth starting—powerful acceleration—more positive control—no gear shifting—these are some of the operating advantages of electric trucks.

C THE CASE FOR BAKER INDUSTRIAL TRUCKS

1. **Complete Line** for every type of industrial truck handling system. In addition to standard Low-Lift, Hy-Lift, Fork, Crane, and Platform Trucks, Baker makes tractors and a wide variety of special trucks for unusual handling operations. For example, Baker makes an Articulated Fork Truck for operation in narrow aisles and congested areas.

2. **Baker Representatives** in all principal industrial centers are qualified material handling engineers, available for counsel on your material handling requirements. They will help you select the proper equipment for your needs.

3. **Baker Engineering and Service** are dedicated to the continuous operation of all Baker Trucks. Adequate stocks of spare parts are maintained to meet emergencies. Baker representatives are available for consultation and help at all times and factory engineers make periodic field trips throughout the country to insure satisfactory operation and to recommend proper truck care.

4. **Baker Motors** on all Baker Trucks are designed and built by Baker, to give greatest efficiency for their specific functions. Baker Travel Motors develop more horsepower and contain more copper and iron than any other motors of the same size.

5. **Baker Power Axle.** Careful selection of properly heat-treated steels, plus many exclusive design features, practically eliminate service failures and greatly reduce maintenance.

6. **Baker Duplex Compensating Suspension** —an exclusive Baker feature which holds power axle in alignment, and prevents twisting strains due to rough floor conditions from being transmitted to frame or steering rods.

These are a few of the advantages offered by Baker Electric Power Industrial Trucks. For further information, call in your nearest Baker representative, or write us direct.

Member: Electric Industrial Truck Association

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2185 West 25th Street • Cleveland, Ohio
In Canada: Railway and Power Engineering Corp., Ltd.

Baker INDUSTRIAL TRUCKS

also shows in spaces 38 and 39 the production obtained. Finally, to facilitate scheduling of the next day's work, he indicates in column 35 whether or not he completed the assigned task.

The placing of even this slight clerical load on the foreman was resisted by numerous operating people when first introduced, on the grounds that many of the best gang bosses could not read or write. However, this objection has been overcome by having, in such cases, another person of the crew assigned to the performance of this duty.

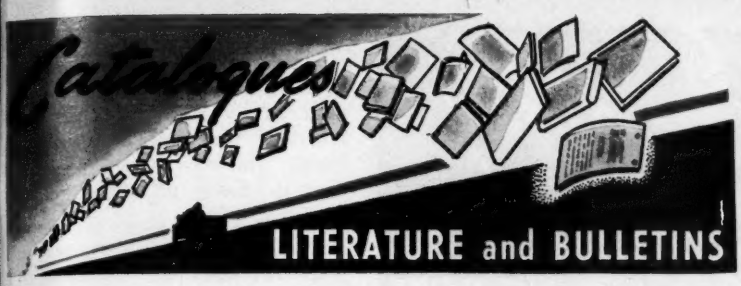
ELSIE GETS A LIFT . . .

(Continued from page 27)

of individual orders containing a few cases of each of various types of goods. The individual orders are made up from the uniform pallet loads on the shipping floor. This "bulk" handling method has resulted in a great saving of time, effort and space.

Since no flat trucks are used in this operation, the fork trucks spot the pallet loads directly on the elevator. (Two elevators are used in the over-all operation—one for "incoming" and another for "outbound" goods.) On the first-floor truck loading dock the pallet loads are taken off by pallet hand lift trucks and moved to the outbound vehicles for convenient handling by the order clerks. When a large order is involved, solid pallet loads may be moved into the trucks. This is also done, as a rule, when the front ends of trucks are being loaded—a method that avoids the need of much time-consuming walking back and forth on the part of the loaders. Since the elevator is of a size and capacity that can accommodate 10 to 12 pallet loads at one time, the "outbound" operation is just about as speedy as the removal of the incoming loads in the warehouse area.

The Borden Company is well pleased with the cooperation it receives from the New York Central. After referring to some records, Superintendent Smith estimated that approximately 80 per cent more goods are handled in the present warehouse than in a previous operation. "And we are doing it with considerably less man-hours," he added.



The publications featured on these pages were written by experts. They are FREE publications. To obtain these use the postcard bound into this issue.

121—Lift Trucks and Portable Elevators . . . Two new additions to the looseleaf catalog published by the Revolvator Co. The folder on lift trucks contains a detailed explanation of the lifting mechanism and operation, including other data. The folder on portable elevators shows a detailed view of the self-contained hoist unit in position on the frame, and also special machines including explosion proof equipment, anti-slip platforms, special floor lock and folding skids for loading barrels and drums.

122—Glued Loads . . . A handbook of facts illustrating and describing step-by-step procedures for palletizing and unitizing shipments of packaged goods with adhesive. It is designed to help the traffic manager visualize direct applications or adaptations of the principle to his particular shipping problems. A presentation of National Adhesives.

123—Storage Batteries . . . A catalog published by the Gould Storage Battery Corp. discussing storage batteries for industrial trucks and tractor service. Two articles, "The Theory of the Lead Acid Storage Battery" and "Care and Maintenance of Your Battery" are included, as well as information about the Kathanode Glasklad construction of the batteries.

124—Mine Conveyors . . . A 16-page bulletin issued by Robins Conveyors, Inc. concerns the use of belt conveyors for mining purposes. The head end, takeup, controls and drives, pulley outfits, intermediate sections, deck section, loading plates, tail section, idlers and belts are described and illustrated.

125—Hydraulic Cranes . . . A four-page illustrated folder discussing the uses, lifting capacity and working range of hydraulic cranes. It contains an explanation of the retractable-extensible boom, said to permit lifting tasks to be carried on where lack of headroom is a problem. A publication of Austin-Western Co.

126—Lift Trucks . . . A quarterly publication issued by the Towmotor Corp. describes the application made of lift trucks by three large California packing and canning plants. In one company, as much as 100,000 various-sized cases of canned goods are handled per week.

127—Cranes . . . A six-page folder describing various on or off-the-road uses of the Tournacrane, ranging from oil tank installation to culvert placing. A chart showing lifting capacities at various reaches is included. A presentation of R. G. LeTourneau, Inc.

128—Conveyors . . . Two folders covering the various types of conveyors made by Samuel Olsen Mfg. Co., Inc. They contain discussions of the gravity roller conveyors, belt conveyors, automatic elevators, hoists and lifts, chain conveyors, subveyors and spiral chutes. Bearings and other construction details are described and illustrated.

129—Non-powered Handling Equipment . . . Four releases by the Re-Bo Manufacturing Co., showing pallets, skids, dollies, hand trucks and removable bodies made by the company. Each product is fully illustrated.

130—Bridge Ramps . . . A four-page circular concerned with one man bridge ramps. Features, advantages and specifications are included. It contains a series of six pictures which show the ramp in operation. A publication by the Elizabeth Iron Works.

131—Industrial Cranes . . . Four illustrated folders about single girder, hand geared, single girder, push type, jib and gantry cranes. Applications, dimensions, specifications and other useful information are included. A presentation of the Industrial Equipment Co.

132—Gravity Conveyors . . . A catalog containing information about the construction features and uses of the gravity conveyors made by Rapid-Standard Co., Inc. It includes complete specifications and data on standard accessories manufactured for use with the equipment. The catalog also shows on-the-spot photos of gravity conveyors in action on many types of jobs.

133—Hydraulic Lifts . . . Two four-page folders published by the Globe Hoist Co. about the industrial truck service lift and the loading dock lift. Uses, features, specifications and illustrations are covered in detail.

134—Cranes, Monorails and Racks . . . Two bulletins presented by the Abell-Howe Co. The one on cranes and monorails includes information about designs and types, standard and special uses, applications in new and old buildings, and bevel-tred-track, switches and other accessory equipment. The rack folder contains suggestions and illustrations of various rack installations.

5 REASONS for using "CANTON" PORTABLE CRANES

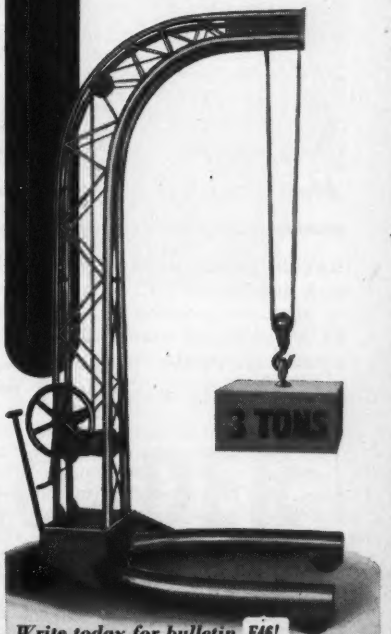
STRONGER Welded laced steel housing on sturdy steel tube base.

LIGHTER Weighs less than one half as much as previous models, insuring one-man operation.

VERSATILE Adjustable extension handle provides additional leverage for heavy lifting.

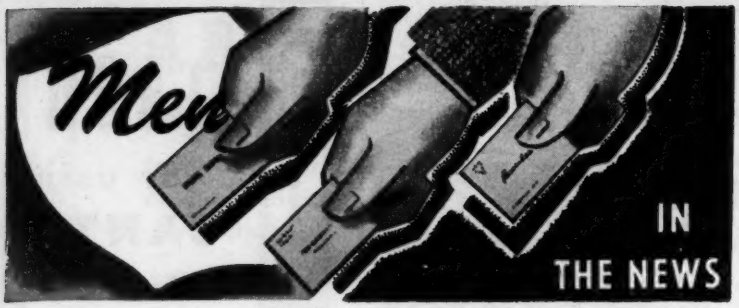
SAFE Self locking worm mechanism holds load at any point.

TWO SPEEDS Fast single-cable operation for light loads. Slower double-cable operation for heavier loads.



Write today for bulletin F46!

The HILL ACME Co.
"CANTON" DIVISION
Cleveland 2, Ohio



WILLIAM OSBORNE has been appointed assistant to the general manager of the Automatic Transportation Co., Chicago, a division of the Yale and Towne Manufacturing Co., by E. F. Twyman, general manager.

W. Osborne

Osborne is a veteran of 11 years' service with Yale and Towne. This appointment marks his first association with the Automatic division, which is a manufacturer of electric-propelled equipment.

Also named to a new post at the Automatic division was *John A. Baldinger*, a navy veteran, who became assistant sales manager. He succeeded Robert M. Whitney, recently appointed advertising manager.

J. A. Baldinger

Prior to the war, Baldinger was associated with the Whiting Corp., manufacturers of overhead hoist, cranes and similar heavy-duty handling equipment.

PAUL CONN has returned from the Navy to become manager of the Lakeside Tool Corp., Chicago, a subsidiary of the LaSalle Engineering Co. Before entering the service, Conn had been chief tool designer for the Buda Co., and process engineer for other firms.

APPOINTMENT of William B. Bradley as director of research of the Philco Corp. has been announced by President John Ballantyne. He succeeds David B. Smith, who was named vice president in charge of engineering.

Joining Philco in 1936, Bradley served first as a factory test engineer in the radio receiver production department. Five years ago, he was placed in charge of the advanced research section of the Philco research division, and early in 1945 he became assistant director of that division.

G. B. EVANS, general superintendent of the Wagner Electric Corporation since 1921, has been promoted to plant manager. Evans began his career with the company in 1904 as a tool and die maker. C. W. Hesse, former assistant general superintendent, moved up to succeed Evans as general superintendent. Hesse has headed several departments since starting with the organization in 1919. Promoted to the position of assistant general superintendent was W. A. Okenfuss.

FRANK D. McCANN of Tuckahoe, N. Y. has been appointed district representative of the New York territory for the Hertner Electric Co., Cleveland, manufacturers of battery charging equipment, motors, generators, and motor generator sets. McCann has been active in sales engineering in the New York metropolitan area for more than 20 years.

The Board of Directors of Manning, Maxwell & Moore, Inc., announce the appointment of J. Robert Kelley as executive vice president of the corporation. He joined the company in 1930 as general manager of the Mill Supply Division.

In 1933 Kelley was sent to Central America in the interest of the Export Department, and in 1934 was given the responsibility of building up the Export Division, covering all of the products of Manning, Maxwell & Moore, in addition to the management of the Mill Supply Division.

OPPORTUNITIES

Men wanted Jobs wanted Lines available

RATES: minimum, 25 words, $2.00; each additional word, 10c. Bold type or all capitals: minimum, 25 words, $3.00, additional words, 15c. All insertions are payable in advance.

"LINES WANTED"

Manufacturers Representative, kind that makes personal contact, men Seattle, San Francisco, Oakland, Los Angeles, San Diego, want lines Production and Material Handling Equipment only exclusive representation for entire coast states considered. Bordeaux Engineering Co., Trans-America Bldg. Los Angeles, (14).

A mechanical engineer specializing in material handling equipment, with twenty years' experience in sales engineering, designing, construction, and installation of such equipment, would like to communicate with manufacturers who want representation on the Pacific coast in overhead handling equipment, cranes, hoists, monorails, elevators, lift trucks, conveyors, and special handling devices and accessories. Box 14, FLOW.

Attention: Material Handling Equipment Manufacturers—Do you need representation in Cleveland, Ohio, and surrounding areas? We are interested in obtaining additional equipment. If you manufacture skids, pallets, castors, conveyor equipment, overhead handling equipment, hand trucks, barrel trucks, and similar materials handling equipment, please contact us. Box 15, FLOW.

Manufacturer of material handling equipment needs two representatives, one in the midwest and one in southern states. Expansion now under way and will be backed by complete merchandising program. Applicants should have several years of material handling experience. Write complete data. Box 18, FLOW.

MAXWELL A. GOODWIN has returned from the army to his pre-war position as manager of the Chicago office of Clark Tructractor, division of Clark Equipment Co. Major Goodwin served on General Somervell's staff.

M. A. Goodwin

L. M. Weaver

Another Clark Equipment Co. new appointee is *L. M. Weaver*, who was named sales manager in charge of Celfor drill and cutting tool division of the company at Buchanan, Mich. Plans are being initiated for expansion in this division.

SETH N. BAKER, on terminal leave after five years service in the army, has joined Philco Corporation's public relations department. Baker was employed by the New York Daily News and the Nassau County, N. Y., Newsday. prior to serving in the army.

ELECTION of new officers by the Electric Industrial Truck Association has been announced. Chosen president for 1946 was Gordon J. Berry, vice-president of the Electric Products Co., Cleveland. F. J. Shepard, Jr., treasurer of the Lewis-Shepard Sales Co., Boston, was elected vice president.

Gordon Berry

Retiring president E. W. Allen, of Thomas E. Edison, Inc., presented new plans for 1946. This includes a broad advertising and educational program, to be conducted under Charles F. Kells, Pittsburgh. The association comprises major producers of electric trucks, batteries and chargers.

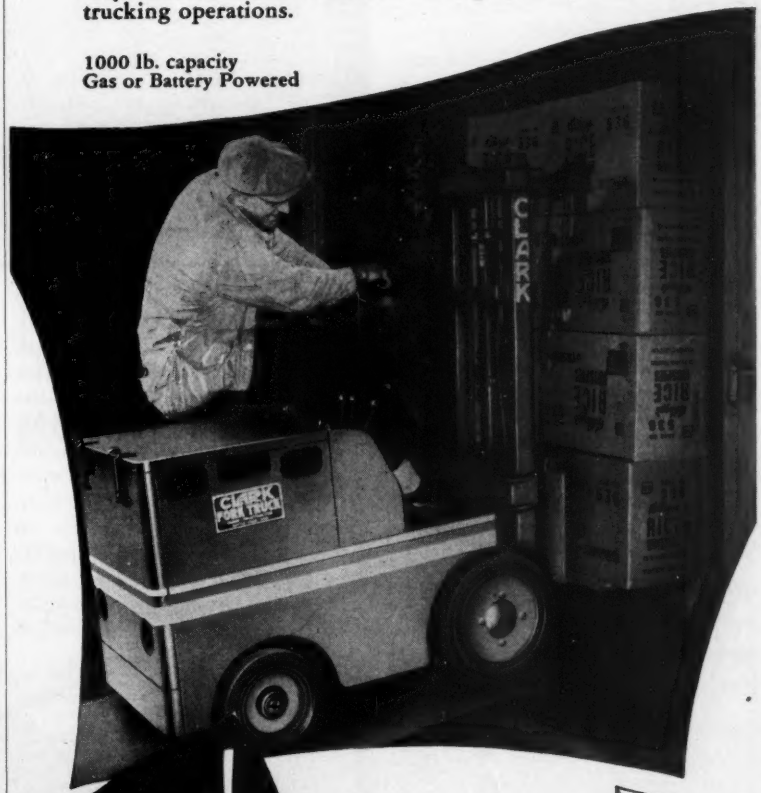
Here it is!

A NEW METHOD... A NEW VEHICLE

A unique fork truck to load and unload highway trucks in less time at lower cost.

Clark Tructractor has from its birth in 1917 pioneered new methods of material handling. As its postwar product it introduces the Clark Trucloader, substituting for manual labor, a light compact fork truck to load and unload highway trucks in a few minutes, making more efficient all trucking operations.

1000 lb. capacity
Gas or Battery Powered



Now!

CLARK TRUCLOADER

Another PRODUCT of CLARK EQUIPMENT COMPANY

SEND FOR NEW BOOKLET ON CLARK TRUCLOADER METHOD

CLARK TRUCTRACTOR DIVISION
BATTLE CREEK, MICHIGAN

Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS
AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS
INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

MORE POWER TO YOU

BY VICTOR J. PAUL

Internal Transportation Department
Goodyear Tire and Rubber Co.,
Akron, Ohio

Well cared-for batteries pay off in maximum electric truck performance and lower maintenance costs. Here is a specific example of a program that is doing both.

•

THE battery, the "heart" of the electric truck, is the silent power plant that supplies the motive power and the lifting power. If it is well cared for and charged regularly, you can extend its life by many months and assure that your electrically powered equipment will be operated at top efficiency. Inadequate charging equipment and haphazard battery care will necessarily result in lower truck productivity and shorter battery life.

Here at Goodyear, our constant aim is to keep all batteries in condition at all times so that maximum machine utilization is obtained throughout the daily 24-hour working period. Batteries are charged under competent supervision and with proper equipment on a regular schedule.

The Charging Schedule

The schedule provides that all batteries, both alkaline and lead, must be recharged after a service period of six hours. While the trucks could run longer than six hours, we adhere to this schedule for the reason that we do not want to operate a battery at less than 80 per cent of its capacity. An efficient battery registers a specific gravity of 1260, and after six hours of operation this will drop to 1200. With the lower reading it could still operate for about four hours. But at the end of that time the specific gravity would be down to 1140, and this in turn would require approximately six hours of charging time to bring the battery up to 1200. We find that our schedule offers us a great advantage. Besides maintaining maximum operating efficiency of the trucks, it also shortens the length of the charging time.

It is recognized that a schedule applicable to one plant may not be the most suitable one for another. The size of the fleet, the number of shifts worked, as well as other factors, have a bearing on specific schedules adopted. Our practice is

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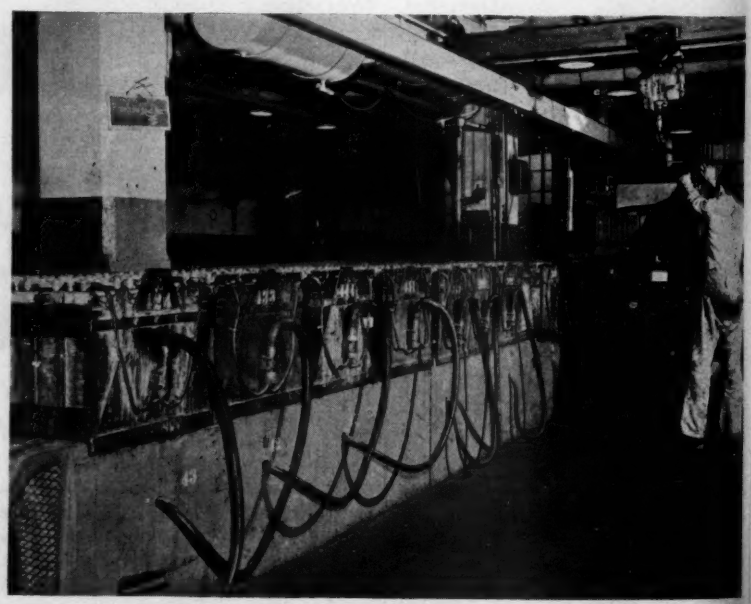


Bench for alkaline batteries is cool-air tunnel. Spreader on hoist is insulated with rubber layer. Tunnel opening can be seen at left.

due in part to the size of our operation—it involves scores of trucks and batteries—as well as to the fact that the equipment is kept in operation 24 hours a day, six days a week.

Charging panel for lead batteries automatically shuts off circuit when generators stop operating.

To make sure that all batteries will be charged at the required time, each truck carries a "Battery Record" card in a pocket. This tells the operator when to charge the battery. At the designated time he takes his truck to the charging room. First he punches the card on a clock which shows both the hour and the date, then hands the card to the charging room attendant, who enters the time of delivery on a record. The attendant then gives the truck operator a new card for a recharged battery. The operator punches this card also, whereupon he proceeds to change the battery. The card used is produced on these pages.

Note that its lower part is headed "Wage Payment". The reason for this is that the truck operator is paid on a piecework basis. The payment of 24 cents he receives for changing the battery covers the interval from the time he left his regular job until he again returns to it. In other words, the operator is thus compensated for the time he has lost from his regular work, which is calculated on a piecework basis.

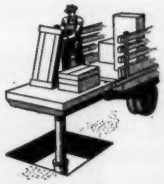
When the battery has been changed and placed on the proper bench, the charging room attendant checks to see how much it is discharged and, if necessary, adds water. For recharging, a tapered plug is used, which has a tight fit and so prevents loss of current that would result from loose joints. The attendant then sets the ampere-hour meter accordingly, and from that point on the automatic charging equipment does the rest of the job without requiring any additional attention. The charging panel shuts off the current automatically when the pre-determined limit has been reached.

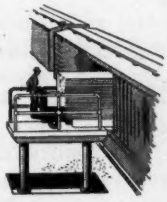
Charging Room Facilities

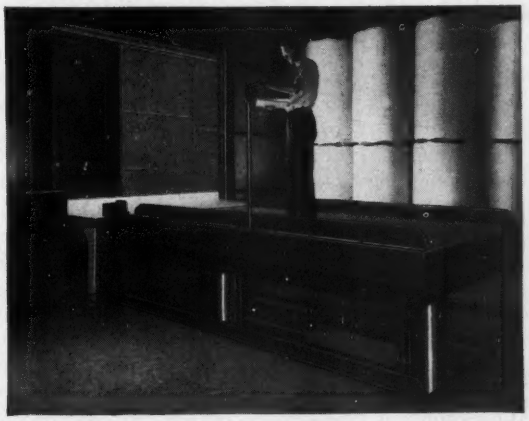
The 80′ x 40′ charging room is divided into equal halves, and each part is covered by an electric hoist on a monorail, permitting the handling of the heaviest batteries with ease and dispatch. As a safety feature, the spreaders used for picking up the batteries are covered with rubber, which has been cured on the metal. This insulation prevents shorts in case the metal bars should come in contact with batteries while they are being handled.

One half of the charging room's area is devoted to alkaline batteries, the other half to load batteries. In the latter half, one set of benches is set up for the smaller

HOW ONE MAN CAN LIFT
50,000 POUNDS







Use hydraulic power to lift loads up to 50,000 pounds directly from plant floor to trucks, freight cars or different building levels. Oildraulic Levelators speed plant traffic, conserve manpower, cut costs. Save plant space, too . . . no need for ramps. Plant floor can be poured at grade instead of at railway car or truck bed heighth. Levelator, when down, becomes part of floor and can be trucked over.
Levelator car is raised by hydraulic jack powered by simple electric pumping mechanism (or by available compressed air). Operation safe, dependable, economical. Installation simple.

WRITE FOR CATALOG RE-201
Catalog RE-201 gives valuable information on the many ways Oildraulic Levelators can be adapted to tough lifting jobs. Write for free copy and get all the facts on this modern equipment. ⟶

ROTARY LIFT COMPANY, 1168 Kansas, Memphis (2), Tennessee

Rotary OILDRAULIC LEVELATORS

BATTERY RECORD

BATTERY NO. .....

..... TIME IN TRUCK

GRAVITY READING IN TRUCK ....

TIME OUT TRUCK

GRAVITY READING OUT TRUCK ....

WAGE PAYMENT

C. C. NO. ..... NAME .....

OPERATION NO. ..... SHIFT .....

TRUCK NO. .....

BATTERY MAN'S O. K. .....

This is battery record, carried on all trucks. It shows charging time, pays the truck operator.

batteries which are used in the motorized hand lift trucks. The latter, incidentally, are charged from special portable generators. The layout of the benches is parallel to an aisle in each half of the room, providing convenience and maximum accessibility for the truck operators. The room has a capacity of about 150 batteries.

A cool-air system serves both the benches for the lead and the alkaline batteries. Because of the solid base plates of the lead batteries, the cool air is blown down on them from the top. The alkaline batteries with their "open" bases, on the other hand, are cooled from underneath. The bench for these batteries is a tunnel through which the cold air is blown by electric fans from the ends. Simple wooden covers are used for openings not occupied by any batteries. This cooling method, of course, keeps the batteries at room temperature, which is an aid to the recharging operation. The cooling not only prevents heating up of the batteries during charging but also reduces the heat engendered during discharging (while in operation on the truck). Battery temperatures are frequently lowered 40° to 45° in an hour.

Special precautions are taken throughout to provide the proper equipment and materials for every charging and handling need. A filtered water system, for example, supplies two overhead tanks with a combined capacity of 200 gallons. To prevent the water from coming in contact with iron, these tanks consist of pure lead. And all fittings and hose connections are either brass or of rubber. Every lead battery on the bench can be conveniently reached with the hose. The solution for the alkaline batteries, also stored in an overhead tank, is similarily conveniently available when needed.

An automatic bell signal system is in use on the distilled water filling system. When water is being added to a battery, this installation automatically indicates by ringing a bell that the proper water level has been reached. This feature is both a time saver and a factor in good housekeeping.

Maintenance Features

Since batteries are being delivered and removed from the charging room 24 hours a day, an attendant is on duty during every shift. In addition to these regular attendants, there is also a special maintenance man. His duty is to inspect and repair batteries that are not giving satisfactory service. A freshly charged battery, for example, may be found to be performing improperly after it has been put in a truck.

In such cases, the maintenance operator makes use of a special apparatus which has been designed by Goodyear engineers—a discharging panel which is shown in one of the photos. The faulty battery will be connected to this panel. By means of this equipment, the operator is enabled to discharge the battery at a constant rate and to measure accurately both the amount of charge put in the battery as well as the amount discharged from it. The finding during this test gives the operator information as to the type of repair the battery may need. (Assuming that its capacity has not dropped below 80 per cent, in which case it will have reached the retirement age.) Any internal repair job thus indicated—new plates, a short, a cleaning job, a breakage of some kind—is promptly made and the battery returned to active service in the shortest time possible.

A clean battery is also a better

Here a battery is going for its regular bath. Booth is equipped for job, described in article.

functioning battery. Operating continuously every day, its evaporation process and the action of the battery gases create corrosive material which, if not removed, would ultimately burn the terminals off. To prevent this, all batteries regularly receive a "bath" once a month. After the top has been dusted with bicarbonate of soda, the battery is taken to the cleaning room, where it is given a thorough going-over with a mixture of live steam and water. (A powdered cleaning compound is added to the water.)

During the cleaning operation, a ventilating fan draws out all fumes and steam from the booth. After the bath, the battery is placed in a metal pan to drain.

When it is completely dry, a small burning torch is used for closing all cracks that may have developed in the compound forming the top of the battery. This burning torch is operated from an acetyline tank which has previously been used for welding. (The remaining acetyline in the tank is sufficient for this purpose, because no pressure is required for heating the compound.)

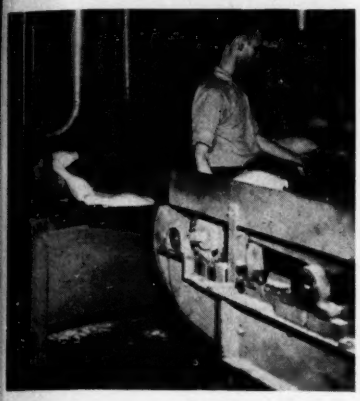
As a result of this systematic attention and care, the batteries in use on our trucks exceed their guaranteed life, regularly giving additional years of service before they reach the retirement age.

FOR A PERFECT SCORE...

(Continued from page 35)

—molding and cue sticks, for example—are fabricated.

Crating Lumber: While this does not equal the number of board feet moved to the kilns or the matcher building, the volume in a year's time may amount to 2,000,000 board feet or more. Hence it should be possible to realize considerable savings in the handling of this material as well. Our new giant team, the straddle truck and tiering truck, are now handling this material with dispatch—as packages—from the lumber yard to the crating and packing operations.



Pins travel from back-knife machine to sander. See "finished pin" conveyor on cover.

Picking Up the Thread

As previously indicated, the dried lumber from the kilns (used for making a complete line of bowling alley furniture and billiard material, as distinct from the bed stock) is delivered by transfer car to the mill. Here the individual pieces are taken off and shaped on many machines, thus producing the numerous piece parts for the assemblies. "Kick backs" (return tracks for bowling balls), settees, score boards, billiard table legs, and pit cushions are just a few of the scores of different kinds of assemblies manufactured. This in turn means hundreds of different kinds of piece parts, each type with its own size and shape. These piece parts, when completed at one operation, are stacked on 4-wheel hand trucks for the next operation. In view of the large variety of these pieces and the short moves from one operation to the next, the flat trucks are found a practical means of handling and moving these parts.

From the ground floor machine shop, the loads are moved by elevator to the second and third-floor assembly stations—cabinet work requiring the same high degree of skill as furniture making. At the end of the spraying and trimming operations, practically all finished subassemblies are delivered by hand truck to packing stations, where the packed material is palletized. This applies both to bowling and billiard equipment. An exception to palletizing is large items "and odd shapes" of bowling alley furniture that are shipped in solid carloads or truckloads. Because of the many and varied lengths and widths of the finished products, our company uses various sizes of pallets. These are designed specifically for the different size units handled, and hence the maximum number of packages is moved on each pallet. Depending on the length of the haul, the palletized loads are moved to storage

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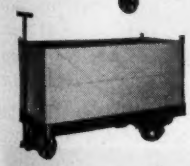
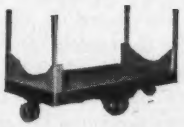
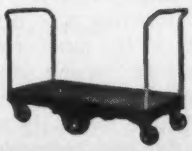
SEND FOR
LOAD-CARRIER MANUAL NO. 1003MH



STANDARDIZATION CREATES PLANT ECONOMY

Market Forge standardized Load Carriers are the solution to even the most complicated and difficult handling problems. Heretofore, all trucks have been built so that construction changes could only be made at great expense or new trucks purchased. Now standardized interchangeable truck types serve all purposes.

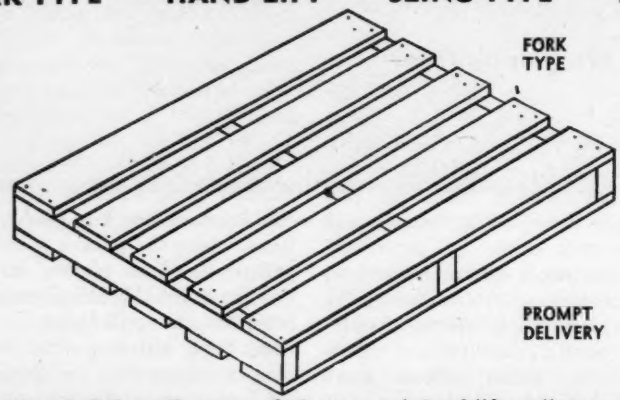




MARKET FORGE COMPANY MATERIALS HANDLING DIVISION 60 GARVEY ST., EVERETT 49, MASS.

PALLETS

FORK TYPE • HAND LIFT • SLING TYPE • SKID



After building sling-type, fork-type and hand-lift pallets and skids for Uncle Sam throughout the war period, Industrial Pallet Co. is now serving industry. IPCO pallets are sturdy. . . of sound mixed hardwoods and drive screw construction. They stand up under the most rigorous service.

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either by pallet hand lift truck or by fork truck.

The Pin Plant—Mark Up a Strike

Because of the shape of the product and the specialized nature of the work, the pin plant functions as an entirely separate operation. The rough blocks—at this stage scarcely resembling the finished pins—arrive loose in freight cars and are loaded in box trucks for the coating operation. This sealant prevents checking (splitting) of the material in the kiln drying operation that follows:

After coating, the rough pins are tiered on large metal framework skids (approximately 14′ x 6′), which are placed on a leveling platform for the tiering operation. Since each load is stacked to a height of six feet on the skid, the leveling platform positions the work for the operator, lowering it to a convenient height as the number of layers increases. In tiering, individual rows of the pins are evened with runners placed under the narrower ends. A full load comprises about 2,100 green pin blocks and weighs eight tons or more. The loaded pin skid is moved by platform truck into the kiln. As in the case of the kiln lumber used for bowling alley and billiard equipment, the dry blocks are discharged at the opposite end from the kiln into the dry pin storage area. The latter is adjacent to the rough turning operations.

Here the sizable loads of rough pins are again positioned by truck on a leveling platform. The high load is lowered for convenient removal by the operator, and is raised gradually as the unloading progresses. In the first operation, the rough blocks are cut to length, and from this point they travel to the next two operations on a turntable. This consists of a large drum, measuring about 20 feet in diameter, on whose outer side two shelves are attached, one above the other. (See photo.) The product thus circles continuously past at the next two work stations.

The first of these, rough turning on lathes, trims the top and bottom of the block. The lathe operator, who has taken the rough pins from the bottom shelf, then deposits the material on the upper

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POSTINDEX

Visible Index

shelf which is constantly circling past his station. The operator at the back-knife machine removes the units from the top shelf and cuts off a thin layer all around, thus shaping the pin. The pins have now left the drum-type turntable, and are then transported via a short conveyor belt to the rough sanding machine. From here they are conveyed to the top-and-bottom machine, which cuts off top and bottom lugs and faces the top and bottom of the pin, etc.

Automatic Spraying

This is the last machining operation. At the next station the pins are delivered by conveyor into a tray, where they are inspected, graded and marked—according to their weight—as kings, queens or dukes. The finished pin conveyor moves past this station within reach of the inspectors, who place each graded pin on an upright peg attached to the pallet conveyor. The conveyor, about 1530 feet long, travels at the rate of approximately 15 feet (or 15 pins) a minute. The pins now travel in an upright position on the conveyor through several finishing operations.

From the first inspection station, the line moves through a top sanding machine, which smooths the tops of the pins. Beyond this point the line doubles back and travels through a wall opening into the finishing room, where the pins pass a series of spray booths. Several coats of lacquer and pigment are successively applied automatically by mechanical action. After every coat the conveyor moves the freshly sprayed pins through an oven, thus drying the lacquer between coats. The ovens are located to the rear of the spray booths. As the line emerges from one oven, it carries the pins past the next spray booth. A mechanism activates the spraying apparatus, spraying each passing pin individually, and beyond the booth the line enters the next oven. In this manner the whole operation is done automatically in a continuous operation requiring no attention on the part of any operator. After the final coat of pigment has been dried, the line moves past a station where operators apply decalcomanias.

Beyond this point, the pins are almost ready for the bowling ball in the alley where the eager bowler aims for a strike. Once the pins have their decalcomanias—the colorful markings that designate their ranks—they move through a wall opening to the sorting and packing station. Here the final inspector removes the individual pins from the pegs on the conveyor. After weighing and inspection, he places them in cartons according to kind.

The sorting operation is facilitated by a specially designed rack. It consists of three shelves or tiers (according to the three kinds of pins) with partitions for each shipping carton. The divisions on each shelf are open front and back, thus providing for a feed on the front side and a take-away on the opposite side. The rack can accommodate 48 cartons at one time.

The full boxes are simply pushed back through the partition by the inspector, who replaces an empty carton in the vacant section. On the other side, the full cases are sealed and then assorted on pallets according to kind. The palletized

Transport by gravity, boxes, crates, cartons, packages to and from production lines, storerooms, trucks, boxcars, loading platforms, ships, docks. Save up to 30% on handling costs. Available in roller or wheel type. Wheels are free-running, full ball-bearing.

Standard sections are 5' and 10' in length. Convenient to carry from place to place where needed. Easily, quickly coupled together to any length without tools, thru exclusive "Quick-Eez" coupling feature. Curved sections are available in 90°, 60°, 45°, and 30° sizes. Mobile units are mounted on swivel casters.

Stands are 4-legged, providing adjustable heights from 12" to 48". Low in cost!

Write for Bulletin 10 Showing Applications

THE E. W. BUSCHMAN CO. INC.

Representatives in Principal Cities

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Ready to be set up: final inspector sorts pins in boxes. Article gives details on sorting rack.

loads are moved either to storage or to outbound units in the nearby shipping dock.

In the Pocket

In the plastics division, where the bowling balls, billiard cushions, etc., are made, operations are likewise geared to mechanical handling throughout. The compounds in bags, bales and slab form arrive at the rail siding that runs the length of the raw material storage area, and all materials are palletized from the cars on single-faced wooden pallets.

For the first processing operations, the unit loads are moved by powered hand truck and elevator to the compounding room on the third floor (in the tower section of the building). The weighed compounds are placed in pans, which move over a gravity roller conveyor through the compounding room and then to the mixers on the second floor. The mixed material then returns by gravity to the first-first-floor processing building.

Part of raw material for bowling balls, about to be moved by powered hand truck to mixing floor. Material then returns by gravity.

Here the milled slabs, hung on a hooked chain-type conveyor, run through a dip tank and are then returned to pallets. A powered truck next moves the loads to the warming ovens, and from here to the presses where the molding operation takes place.

After the stock has been put in the molds, the latter are then placed on vulcanizer trays which are moved by powered truck to the vulcanizers. The truck also removes the hot and heavy loads from the vulcanizing units at the end of the operation and, after cooling, positions them at the benches where the molds are opened. The material, loaded in specially constructed boxes, provided with runners, is from here again power handled in sizable units to the rough turning lathes. From this point the balls at first move over a gravity roller conveyor, then over wooden tracks through a series of finishing operations. These wooden tracks are much like the return tracks in a bowling alley. To protect the smooth finish of the product, the final sections of the track are covered with felt. The finished and inspected balls are packed in cartons, four to each unit. As in the other operations, the shipping containers are palletized at the end of the line.

Ready for a strike: Through final stations balls travel on wooden tracks that are felt-covered.

Ever-Present Challenge

Many and varied handling devices are integrated in the diversified operations of our company. Whether it's in the lumber yard, the kiln building, the mill, the matcher plant, packing of finished subassemblies, the pin plant or the plastics division, each kind of device is designed to handle and move every type and shape of product with the least effort and at the lowest cost.

Here's wishing you a 300 score in your material handling program!

ON THE PALLET . . .

(Continued from page 40)

tween and firmly bonded to thin sheets of aluminum, stainless steel, wood veneer or plastic, has been announced jointly by the Glenn L. Martin Company and the U. S. Plywood Corporation. The "honeycomb" is impregnated before the core is formed with a phenolic resin. The type of facing and thickness can be made to vary with various load requirements. Originally used for airplane floors, the new material, it is thought, will have its most fertile field of application in freight cars, pullman cars, and motor mobile equipment.

ACCORDING to Gordon J. Berry of Cleveland, president of the Electric Industrial Truck Association, the cost of moving and storing materials inside and outside of plants—as well as in warehouses—adds fully 30 percent to the total cost of the product when mechanized equipment is not used.

"Industry as a whole," Mr. Berry says, "has performed miracles in reducing production cost by using every conceivable manufacturing short-cut. But one of the most important wastes lies in the cost of handling and storage of the flow of materials whether it is inside a plant, between groups of buildings, on the shipping docks or in a wholesaling warehouse. It is time that this problem be recognized by industry generally, as it is already recognized by most modern plants."

ACCORDING to Charles Milbauer, chairman of the transportation committee of the Warehousemen's Association of the Port of New York, Inc., there is only one immediate way of easing car shortages and that is prompt unloading.

Mr. Milbauer pointed out that a box car is not a proper warehouse, and railroads today operate 12,500 fewer serviceable box cars than they did in 1934.

According to the Car Service Division of the Association of American Railroads, present box car ownership stands at 743,696 cars of which 32,541 are not in operating condition and 325,041 are in "bad order," with weekly loadings averaging somewhere in the neighborhood of 378,000 cars and demands continually rising. The pressure is on to reduce unloading time and to place more cars into active service for their main purpose quickly.

JOINT conferences of engineers and manufacturers should stimulate the planning and production of constantly improved machines and devices for handling materials, more efficient than any we have had, and available in cost and adaptability to a wider range of industry. And industrial management generally, in conference with engineers familiar with the problems involved, can not only study how to use such machines and devices with maximum results, but also well afford to consider carefully means of securing the loyal cooperation of their workers in removing every factor of waste in their industries.—R. M. Gates, president, Air Preheater Corporation.

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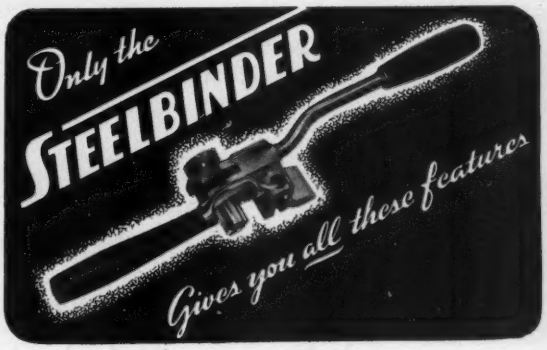

1 **TIES A TIGHTER TIE . . .** STEELBINDER puts *no wedge or lip* underneath the strap. Strap stays tight, is not loosened as the tool is disengaged.

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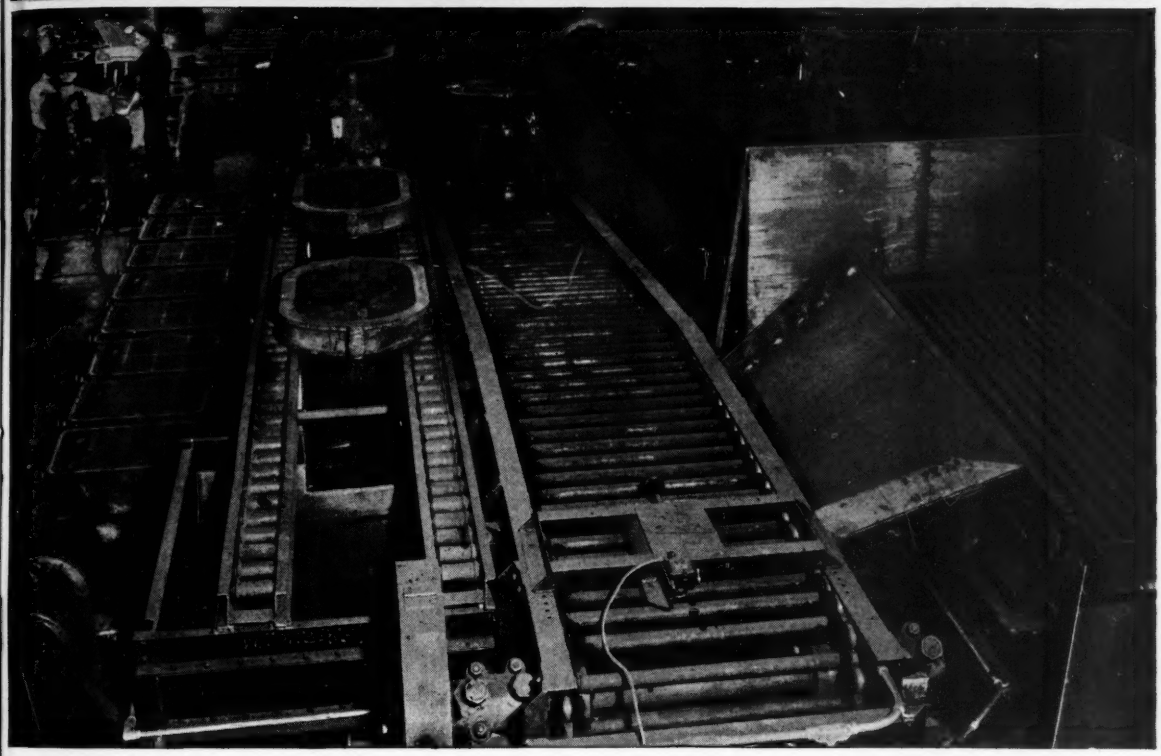

For heavy-duty work, such as illustrated above, where power conveyers are required, the pallet type Chain Conveyer is one of the most practical. It is capable of handling very heavy loads at carefully controlled speeds. The many different types of pallets available add to the flexibility of conveyers of this type. They can be of steel or wood, and can be spaced at various intervals in the chain, or can be interlocking. There is a Mathews Engineer operating in your vicinity. Ask him about Mathews Chain Conveyers, and the many other types of Mathews Foundry Conveyers which have been engineered to serve production

Mathews Conveyer Company

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